THE EFFECTS OF OBJECT LOCATION TRAINING ON SPATIAL SELF-EFFICACY, LOCATION RECALL, AND STRATEGY USAGE

By

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Abstract of Dissertation Presented to the Graduate School
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The present study was undertaken to address issues relevant to memory training and object location recall, including strategy use measurement and maintenance, individual differences, performance maintenance, and practice effects. Older women preselected for "at risk" recall performance and/or spatial self-efficacy were randomly assigned to either a self-efficacy-plus-memory-training group or a no-treatment, wait-list control group. Participants in the training group received strategy training materials (a videotape and a chapter), instructions to set goals for homework exercises, weekly phone calls, and a laboratory practice session, all designed to increase participants' performance and self-efficacy for object locations memory. Wait-list participants received the training videotape and chapter after the posttest, but did not receive the other aspects of the manipulation. Results from strategy use measures showed that more trainees than wait-list participants used imagery following training. However, results from the self-efficacy and spatial memory measures showed that the two groups did not differ significantly on self-efficacy or object locations memory at either the posttest or the six-week followup test. Low statistical power and practice effects could be responsible for the lack of between-group differences for the performance measures. Strategy utilization deficiencies related to overburdened processing resources may also explain why the trained participants used the strategies, but did not appear to benefit from them. Future memory training studies with older adults should measure strategy use so that strategy utilization deficiencies may be detected and, with training to the point of automaticity, eliminated.

INTRODUCTION

Memory training for older adults, as conducted for the past two decades, has offered researchers the opportunity to see whether and under what circumstances age-related declines in memory can be reversed or stabilized. In general, numerous studies have shown that older adults can indeed be trained to utilize an assortment of strategies to perform better than their untrained peers (West, 1995). More recently, the concerns of researchers have been more pragmatic: to understand the value of memory training for trainees' daily lives. Clearly, this is a worthy goal, because older adults who enter into studies of memory training are vocal in their desire for gains in their daily use of memory. A future goal of memory training may be to maximize the effectiveness of interventions. However, the value and effectiveness of memory training cannot be fully assessed until a number of issues are more adequately addressed in the literature. The purpose of the present research was to address these issues, including practice effects, individual differences, and maintenance of strategy use and performance. Moreover, unlike most previous research, this study sought to test an intervention with a theoretical focus.

REVIEW OF LITERATURE

Issues

Individual Differences: Performance and Self-Efficacy

Many researchers have stated the importance of studying individual differences (Kotler-Cope & Camp, 1990; West, 1989, 1995; West & Tomer, 1989; Yesavage, Lapp, & Sheikh, 1989). For example, it might be important to match training methods to the individual's skills (Kotler-Cope & Camp, 1990; Yesavage et al., 1989), or to use individual differences as predictors of memory training outcomes. The "intervention program should match the unique features of the person (e.g., skill level, personality, cognitive style) to the type of materials...and techniques...employed" (Kotler-Cope & Camp, 1990, p. 232). Yet another way of examining individual differences was to identify persons at risk for poor performance on a particular task, and to offer those individuals remediation.

Yet, despite years of recommendations, few studies examined and utilized individual differences information to enhance memory training (West, 1995). This is unfortunate, because individual differences should be examined for many reasons. Individual differences may interact with training effects (West, 1995), preventing researchers from adequately assessing the impact of their training programs

(West & Tomer, 1989). For example, floor effects and ceiling effects could be prevented by tailoring task difficulty to participants' abilities or other characteristics (Yesavage et al., 1989). Individual differences might be useful as predictors of training outcomes (Yesavage et al., 1989). Moreover, using information about such differences might enable researchers to make training more effective for each participant (West & Tomer, 1989). Finally, participants could be selected for skills training based on their poor performance on some task, and in this way, individual differences could be used to enhance performance for at-risk persons.

This last meaning of "individual differences" was the one used in the present study, which preselected participants based on their poorer performance (as compared to their peers) on two dependent measures: self-efficacy and object locations recall. This was important, not only because individual differences were so rarely utilized in memory training studies of older adults, but also because the self-efficacy component of the measurement and training provided a theoretical basis for this work.

Self-efficacy: A theoretical basis

In explaining why self-efficacy theory might supply a theoretical rationale for this and other memory training studies, it is important to first outline the major tenets of the theory, and then to explain why they should apply to the domain of memory for older adults--and particularly for older women. Self-efficacy is the domain-specific belief that one can successfully engage in a particular activity (Bandura, 1977). Self-efficacy beliefs are important because they translate into actions: Many studies have shown that increases in self-efficacy predict future attempts at coping during a difficult task or in a formerly threatening situation (Bandura, 1986). The primary testing grounds of the theory have been phobia interventions, using young adults as participants. Self-efficacy theory has been applied to snake phobia (Bandura, Adams, Hardy, & Howells, 1980; Bandura, Reese, & Adams, 1982), agoraphobia (Biran & Wilson, 1981; Williams, Kinney, & Falbo, 1989; Williams & Zane, 1989) and acrophobia (Williams, Dooseman, & Kleifield, 1984; Williams, Turner, & Peer, 1985). These studies and others showed that self-efficacy predicted coping behavior: Participants with higher self-efficacy persisted longer and increased their effort in anxiety-provoking or difficult task situations (Bandura et al., 1980, 1982; Biran & Wilson, 1981; Williams et al., 1984, 1985). Moreover, self-efficacy is a domain-specific construct; many studies have shown that high self-efficacy for a given task does not translate into high self-efficacy for unrelated tasks (Bandura et al., 1980; Brody, Hatfield, & Spalding, 1988; Williams et al., 1989).

Self-efficacy is best increased through enactive mastery experiences--experiences participants undergo that allow the participants to see that they have mastered a feared activity (Bandura et al., 1980; Biran & Wilson, 1981; Gist, Schwoerer, & Rosen, 1989; Williams et al., 1984, 1985; Williams & Zane, 1989). Enactive mastery experiences involve participants in hands-on activities, rather than focusing on thoughts or feelings. As participants succeed at increasingly difficult tasks (which the author terms "mastery order"), this increases the likelihood that they attribute these successes to their own efforts and skills. Mastery experiences are important for building a _mastery orientation_, an orientation towards mastering activities that will lead to successful outcomes and to attributional "ownership" of one's successes (Bandura, 1989).

Increases in self-efficacy and mastery are also associated with attributional reframing--participants' cognitions are restructured so that they claim responsibility for their memory successes, and attribute failures to a lack of effort (Schunk, 1982, 1983). Although attributions can be negative ("I can't remember anything"; "I only succeeded because of beginner's luck") or positive ("I need to try harder in order to succeed"; "I'm remembering these object locations because I've put forth a lot of effort in learning the strategies, and because I'm good at this"), reframing focuses on the positive. It is only when people attribute their successes to their own skills and effort that self-efficacy is enhanced (Bandura, 1977, 1986).

Attributional reframing can be effective for successes as well as failures. For successes, people can be encouraged to attribute their performance to effort and skill rather than to luck. For failures, attributional reframing may be especially necessary: Persons who make negative attributions for memory failure are less likely to develop enhanced self-efficacy than are those persons who are directed to attribute failures to a lack of effort, and successes to skills plus effort (Schunk, 1982, 1983). One of the reasons that attributional reframing may be effective is that it emphasizes learning rather than outcomes (Elliott & Lachman, 1989). A learning goal lessens anxiety and may increase participants' utilization of strategies more after completion of training (Elliott & Lachman, 1989).

The setting of reachable, concrete goals by the experimenter and/or by participants has been shown in many studies to enhance self-efficacy (Schunk, 1985, 1989). When participants reach a goal, they may appropriately deduce that they have successfully mastered a task. Thus, goals, like attributional reframing, a learning orientation, and mastery order, help to enhance mastery by providing participants with signposts of their success.

Albert Bandura (1989), originator of self-efficacy theory, has discussed the construct's potential importance for memory training studies. Self-efficacy should be measured because it may be related to several aspects of successful memory training, including maintenance: "If people are not fully convinced of their personal efficacy they rapidly abandon the skills they have been taught when they fail to get quick results or it requires bothersome effort" (Bandura, 1989, p. 733). On the other hand, the person high in self-efficacy for the task may readily maintain the strategy, given adequate incentives and abilities to do so (Cavanaugh & Green, 1990).

Although the theory has not yet been widely applied to older adult populations, self-efficacy theory may be especially important for examining memory beliefs for older adults (e.g., Berry & West, 1994; Welch & West, 1995). Because of real and imagined memory failures (one's own and those of age peers) associated with the aging process, and because of prevalent negative stereotypes about memory aging, many older adults may not believe that it would be worthwhile to expend the effort required to learn most of the memory strategies currently being taught (Welch & West, 1995). Older adults are less certain about their memory abilities than are younger adults (Berry, West, & Dennehy, 1989), and their lowered self-efficacy could translate into problematic behavior. For example, the inability to find personal articles in one's home could be more stressful for older adults than for younger adults, given the former's worries about memory aging. Behavioral consequences might include avoidance of situations in which object locations have to be recalled, or lack of perseverance during search. For instance, an older woman who frequently loses her hearing aids might experience lowered memory self-efficacy for object locations. She might not initiate a search for her hearing aids, or she might terminate her search prematurely, despite the obvious importance the aids have for her independence and comfort. Thus, everyday functioning and independence may be impaired by a low sense of self-efficacy (Welch & West, 1995).

Older women may be especially at risk for lowered self-efficacy, due in part to their socialization at a time when men were considered to have stronger cognitive capabilities, overall, than women. Although this has not been studied extensively, there is evidence that older women may have reduced memory self-efficacy as compared to men. Notwithstanding results that show comparable or superior performance, relative to men, older women tend to underestimate their cognitive capabilities (Hertzog, Dixon, & Hultsch, 1990; Lachman & Jelalian, 1984). Interestingly, Hertzog and colleagues found that women underestimated their abilities in earlier trials, and their predictions became more accurate across trials, suggesting that the women began by underestimating their skills and then updated their predictions and made them more accurate with increased task experience. In a recent study in West's laboratory (West & Knabb, 1994), older couples, as well as other older adults, participated in memory training. The pretest scores indicated that husbands were much more confident of their abilities than wives, and that the wives significantly underestimated their scores. In the full sample, the women performed significantly better than the men, but were not higher in efficacy or global performance predictions (West & Knabb, 1994). Other recent research (Welch, West, Thorn, & Clark, 1996) found that both older and younger women had lower overall self-efficacy for spatial memory than did older and younger men. On an object locations task, the women had higher performance scores than the men. At the same time, the men overestimated their abilities more than the women did (Welch et al., 1996).

At present, few studies have tested self-efficacy theory with memory training. "There are indications that studies emphasizing changes in memory self-efficacy may show one-month maintenance of training effects (West, 1995, p. 496)." For example, in one unpublished study, self-efficacy was raised following memory training with older adults (West, Bramblett, Welch, & Bellott, 1992a). The memory training included evaluation and rejection of memory aging stereotypes, strategy training, and mastery experiences for recalling prose and grocery lists. Training emphasized the malleable nature of memory skills at any age, and attempted to dispel the "entity" notion of memory--that memory is unchangeable and inevitably worsens with age (Elliott & Lachman, 1989). Trainees were also taught to use memory strategies, and were given mastery experiences in the form of participants' successful use of the strategies to recall grocery lists during practice sessions. A one-month followup found maintenance of increased self-efficacy after training, in addition to increases in memory performance.

Another study assessed self-efficacy with a single question asking participants if they could recall 12 words or 12 digits in exact order (Rebok & Balcerak, 1989). Memory training focused only on training participants to use strategies; it did not teach participants to challenge their beliefs. The results showed that memory training did not increase self-efficacy, even though memory performance improved. Perhaps this study failed to find increases in self-efficacy because assessment of self-efficacy with only one or two questions is not adequate; a self-efficacy questionnaire with several scales would provide a more reliable assessment of the construct. Alternatively, memory training alone, without training that emphasizes changes in efficacy beliefs, may be insufficient to raise efficacy. "It may be necessary for the training to emphasize change in efficacy beliefs, as has been the case in the efficacy-related intervention literature" (West, 1995, p. 496).

Some research has challenged the notion that effective training must emphasize efficacy beliefs in order to change them. For example, older participants demonstrated pre- to posttest increases in general memory control beliefs whether or not cognitive restructuring (educating older adults about adaptive and maladaptive conceptions of memory) was a feature of the training condition (Lachman, Weaver, Bandura, Elliott, & Lewkowicz, 1992). However, treatments that included cognitive restructuring were more effective than treatments without (Lachman et al., 1992). In another study, older adults who received feedback regarding correct and incorrect answers on test questions demonstrated increases in self-efficacy scores, but their memory performance scores did not show pre- to posttest increases (Dittmann-Kohli, Lachman, Kliegl, & Baltes, 1991).

Thus, evidence exists that self-efficacy theory is a potentially important aspect of memory performance in late life. The empirical data on training for older adults were mixed. At the same time, the theoretical framework and empirical results for cognitive interventions with other populations (Bandura & Schunk 1981) suggested that an emphasis on changing beliefs (in addition to teaching strategies) would result in greater change and more maintenance of intervention effects. Thus, self-efficacy theory may have heuristic value for memory training research and the purpose of the present research was to test an intervention based on self-efficacy theory, using older women as participants.

The considerable work done in memory training with older adults has brought forth many other issues, in addition to those already presented concerning individual differences. Next, issues related to creating memory interventions are discussed, including practice effects, the measurement of strategy use, and the maintenance of strategy use and performance.

Practice Effects

Practice effects occur when a group of participants shows improvement merely as the result of experience with the testing stimuli. With a no-treatment control group present, test practice effects may easily be distinguished from training effects: The increases in the control group will reflect test practice effects, and if the training group improves still more, the increase is taken as a demonstration of the impact of training over and above practice associated with test-taking. Although the true worth of our manipulations can never be known without controls, a surprising number of memory training studies with older adults either include "control" groups which receive some form of treatment (e.g., Hill, Allen, & McWhorter, 1991; Rankin, Karol, & Tuten, 1984; Robertson-Tchabo, Hausman, & Arenberg, 1976), or exclude control groups altogether (e.g., Anschutz, Camp, Markley, & Kramer, 1985, 1987; Hill, Yesavage, Sheikh, & Friedman, 1989; Yesavage & Rose, 1984). For example, in one study, control participants were told to generate locations but were not taught how to use them to learn lists with the method of loci (Robertson-Tchabo et al., 1976); this could be seen as providing a sort of partial treatment and gains for this group therefore could not be attributed to the effects of practice alone. This common failing is well-documented: One meta-analysis found that 70% of the examined memory training studies of older adults excluded no-treatment control groups (Verhaegen, Marcoen, & Goossens, 1992).

Because of the danger that practice effects incurred during testing can improve memory scores, and thus confound interpretations of gain, authors have warned that studies must include a no-treatment or wait-list control group in addition to the training group, both of which must receive a pretest and a posttest (West & Tomer, 1989). However, some authors have claimed no need for controls, based on prior research showing no improvement by controls relative to that of trained participants. For example, Yesavage (1983b) did not find increases in control participants' scores; this served as a justification for the lack of a control group in later studies (e.g., Yesavage & Jacob, 1984). Other researchers challenged this assumption, showing that practice alone could constitute an effective memory training intervention for older adults (Kliegl, Smith, & Baltes, 1989; Treat, Poon, & Fozard, 1981), and that participants--even the "do-nothing" control participants--learned to impose their own processing on the stimuli (Camp, Markley, & Kramer, 1983a, 1983b).

In general, the results from memory training studies that used appropriate controls have shown that test practice effects did contribute to memory score increases, but that training effects had a benefit which exceeded practice alone (Hill, Sheikh, & Yesavage, 1988; Pratt & Higbee, 1983; Rebok & Balcerak, 1989; Scogin, Storandt, & Lott, 1985; Schmitt, Murphy, & Sanders, 1981; Zarit, Cole, & Guider, 1981a). Thus, the failure to find improvement for control groups in past studies is not a sufficient reason to exclude control groups from future studies. The present research included a no-treatment, wait-list control group to test for practice effects.

Measurement of Strategy Use

Experimenters typically assume that improvements in memory performance are due to the memory strategies trained during the study. But is strategy use the reason for improvement? The only way to know is to measure strategy use independently from performance measures, and to examine the relationship between scores and strategies. If strategy use and performance both increase for memory training groups, but not for control groups, and if strategy use predicts performance, then it can be inferred that the strategy training is the reason for improvement.

Unfortunately, most studies in the adult memory training literature rely exclusively upon improvements in memory to ascertain the effectiveness of their training, without separate measures of strategy use (e.g., Kliegl et al., 1989; Treat et al., 1981; Yesavage, 1983a, 1983b). The independent measures of strategy use that have been incorporated include self-reports (e.g., Anschutz et al., 1987; Rankin et al., 1984; Rebok & Balcerak, 1989; Wood & Pratt, 1987), overt rehearsal behaviors (Murphy, Schmitt, Caruso, & Sanders, 1987; Sanders, Murphy, Schmitt, & Walsh, 1980; Schmitt et al., 1981), and clustering scores (ARC scores; e.g., Rankin et al., 1984; Sanders et al., 1980; Schmitt et al., 1981).

It initially appeared that memory training has not been very effective with older adults: About half of the studies that measured strategy use did not find greater change for trainees than for controls. These tended to be studies in which neither treatment nor control groups showed differential memory gains (Pratt & Higbee, 1983; Rankin et al., 1984; Rebok & Balcerak, 1989; Wood & Pratt, 1987). Other studies found greater memory improvements and greater strategy use for older trainees than for control participants (Murphy et al., 1987; Sanders et al., 1980; Schmitt et al., 1981).

The present study measured strategy use in a self-report format at both the pretest and the posttest. Participants were interviewed regarding the strategies they used during study and recall for an object locations task, and then participants completed a strategy use checklist, indicating each strategy they used during the task.

Maintenance of Strategy Use and Performance

Generally, maintenance occurs when strategies and higher performance continue after the initial posttest. Tests for strategy use maintenance are far less common than tests for maintenance of performance; and often, studies include neither measure. This is unfortunate, because maintenance of both types is vital to the memory training field. Without adequate tests of maintenance, it is impossible to know how long the effects of training last. Without proof that training is producing long-term benefits, we must ask ourselves whether our present training methods are sufficient, and indeed, whether memory training is worth the effort to researchers as well as to participants.

For many years, researchers inferred successful strategy maintenance from performance maintenance. In these studies, trainees continued to outperform control group participants on followup tests or trials, but an independent measure of strategy use was lacking (Flynn & Storandt, 1990; Scogin et al., 1985; Sheikh, Hill, & Yesavage, 1986; Stigsdotter & Backman, 1989; Treat et al., 1981; West & Crook, 1992). Worse, many other studies have failed to test for any sort of maintenance (e.g., Hultsch, 1969; Pratt & Higbee, 1983; Yesavage, Rose, & Bower, 1983). Of these, many could not have assessed strategy maintenance even with the inclusion of followup tests, because independent measures of strategy use were excluded (see above).

The problems with the above approach include the possibility that practice effects are driving results, or that some factor other than strategy use explains performance maintenance (West & Tomer, 1989). Fortunately, authors are beginning to recognize a need for independent measures of strategy use (along with performance measures) at a pretest, posttest, and at least one followup.

Presently, only a few studies have been identified that used variations of this improved methodology (Anschutz et al., 1987; Murphy et al., 1987; Schmitt et al., 1981). These studies focused on maintenance lasting from a few minutes (Murphy et al., 1987) or hours (Schmitt et al., 1981) after the posttest to three years (Anschutz et al., 1987) following memory training. Another study (Wood & Pratt, 1987), although failing to measure strategy use on multiple occasions, confirmed (with a strategy use phone interview that followed training by four months) what most of the other studies found: Older adults were not maintaining strategy use, whether measured by self-report (Anschutz et al., 1987; Wood & Pratt, 1987), overt rehearsal (Murphy et al., 1987), or direction of gaze during study (Murphy et al., 1987). Whether the strategy trained was the method of loci (Anschutz et al., 1987), self-testing (Murphy et al., 1987), or the pegword method (Wood & Pratt, 1987), older trained participants did not maintain use of the trained strategy. For example, one study utilized interviews three years after training to examine whether participants had continued to use the trained strategy, the method of loci (Anschutz et al., 1987). Although five of the nine participants did report using the strategy during recall of a 12-item list also tested at this followup (note: Performance recall was slightly lower than it had been prior to training), most participants reported that they had not used the method of loci over the past three years.

As with maintenance of strategies, many studies precluded assessments of performance maintenance by excluding followup tests or delayed performance trials (e.g., Hill et al., 1989; Schmitt et al., 1981; Yesavage & Jacob, 1984). Other studies measured and found performance maintenance for a variety of types of recall, including recall of word lists (Anschutz et al., 1985; Flynn & Storandt, 1990; Robertson-Tchabo et al., 1976; Scogin et al., 1985; West & Crook, 1992), prose passages (Zarit et al., 1981a), name-face pairs (Hill et al., 1988; Scogin et al., 1985; West & Crook, 1992), face recognition (West & Crook, 1992), locations of household objects (West & Crook, 1992), and first-last name pairs (West & Crook, 1992).

Although some of these tests for maintenance were rather short, spanning four days or less (Hill et al., 1988, 1991; Robertson-Tchabo et al., 1976) or one week (West & Crook, 1992; Zarit et al., 1981a; Zarit, Gallagher, & Kramer, 1981b), at least four of these studies found performance maintenance lasting as long as one month (Anschutz et al., 1985; Flynn & Storandt, 1990; Scogin et al., 1985) or six months (Stiggsdotter & Backman, 1989). For example, one study examined six-month maintenance for tasks of word recall, digit span, and visual retention; participants who were in a multifactorial training group (that included training in the method of loci, interactive imagery, verbal organization, sustaining attention, and muscle relaxation) were successful in maintaining their task performance for six months (Stiggsdotter & Backman, 1989).

Maintenance was not always found, however (Anschutz et al., 1987; Sheikh et al., 1986; Treat et al., 1981). In one case, none of the groups showed differential improvement for paired-associate word recall (however, the maintenance examined spanned but a few minutes; Erber, Abello, & Moninger, 1988). This outcome could be due to practice effects, or could be attributed to an extremely rudimentary manipulation: Two sentences' worth of directions distinguished the experimental (imagery) condition from the control condition (Erber et al., 1988).

Why were maintenance of strategies and performance so poor for older adults? Some authors have asserted that memory training is simply not powerful, noting that memory improvements after training are slight and transient (Scogin, 1992). Others cited faulty research designs: Most studies do not include the delayed follow-ups that are needed to adequately assess long-term maintenance (Willis, 1989), relying instead on maintenance tests that occur only a day or two (sometimes an hour or two) following the posttest (see West, 1995). Still others have noted that maintenance may not be found either because participants find the strategies too complicated to maintain (Yesavage et al., 1989), or because participants do not understand that considerable effort is necessary to maintain the strategy, and are unprepared or unwilling to expend such effort (West, 1995). Indeed, some researchers suggested telling participants that hard work, including frequent and long-term practice, will be required to acquire and maintain new cognitive skills (Kotler-Cope & Camp, 1990). Moreover, with older adults, who may have lost some flexibility to use the more abstract strategies with age, maintenance may not be found because researchers are teaching the less effective strategies, or because the strategies are too unlike those that participants would be comfortable using in their daily lives. For instance, older adults may find it easier to learn interactive imagery when the images are more like those in their everyday lives than when the images taught are bizarre or unusual. Finally, perhaps internal strategies are so much like "normal thinking" that they do not stand out as unusual on self-report measures (Duke, Haley, & Bergquist, 1991).

Ultimately, however, we do not know why older adults are not maintaining strategies, despite the fact that performance maintenance is often found (e.g., Flynn & Storandt, 1990; Robertson-Tchabo et al., 1976; Scogin et al., 1985; Stiggsdotter & Backman, 1989; West & Crook, 1992; Zarit et al., 1981a, 1981b). The measurement of strategy use at each testing occasion is vital to clarifying this issue.

Toward that end, the present study measured strategy use and performance at a pretest, posttest, and followup. Strategy measures consisted of an interview and a questionnaire on which participants indicated which strategies they used during encoding and/or retrieval on an object locations recall task. Participants were taught a range of strategies varying from simple to complex. In this way, it was hypothesized that the types of strategies trainees used could be identified across testing occasions, to examine maintenance. By using such methods, it is possible to state with accuracy not only that strategy use has been maintained, but--if the strategy use predicts performance and is greatest for the trained group--that strategy use is controlling improved performance.

Location Recall And Spatial Memory

Memory for object locations may provide a good domain in which to test for memory training effects, because it is a domain in which older adults must remain competent in order to maintain their independence, and because numerous cross-sectional studies covering a wide spectrum of object locations tasks suggest that older adults may be at risk for reduced performance on some types of spatial recall tasks. These studies have shown that spatial recall declines with age, rather than representing an automatic process impervious to age differences as was once thought (Hasher & Zacks, 1979). Moreover, some research indicates that object location memory problems are a common memory complaint among older adults (see West, 1989). Finally, none of the studies reviewed here provided training for this domain, making spatial recall a relatively untried area of memory training.

Spatial skills and aging should be studied because they bear on older adults' independence. Some researchers have emphasized everyday spatial memory tasks such as recalling where one's car keys are, how to get to the store, and how to find a friend's hospital room or a significant landmark (Kausler, 1994; Kirasic, 1989; Ohta & Kirasic, 1983; Sinnott, Bochenek, Kim, Klein, Robie, Dishman, & Dunmyer, 1992; West, 1986, 1992). Although spatial memory of all types is important to maintaining independence, the focus in this paper is on memory for the location of objects. A decline in the ability to recall the spatial location of objects translates into everyday hardships. For example, the failure to recall the placement of common household objects, such as glasses or car keys, might result in hours of frustration and/or the need to depend on others for assistance.

One type of spatial recall task involved having participants reconstruct arrays of objects the experimenter has set in place. In most studies of reconstruction, older and younger participants were shown an array of familiar or novel objects arranged against some background or in cubicles. After a delay during which participants engaged in a distractor task for a few minutes, they were shown the objects and the background against which the objects were formerly arranged, and were then instructed to reconstruct the array just as they had seen it earlier (Bruce & Herman, 1986; Park, Cherry, Smith, & Lafronza, 1990; Sharps &

Gollin, 1987, 1988). In general, age differences in location recall were clearly present on tasks in which older and younger adults were asked to recall the locations of objects so placed (e.g., Park et al., 1990). This was particularly true when the context was visually bland (Cherry & Park, 1989; Park et al., 1990; Sharps & Gollin, 1987, 1988), and when objects were placed into matrices randomly rather than contextually organized (Pezdek, 1983; Waddell & Rogoff, 1981). However, these deficits were reduced (and sometimes eliminated) by making the context more visually distinctive (Park et al., 1990; Sharps & Gollin, 1987, 1988), and by organizing the objects or the context in which the objects appeared (Pezdek, 1983; Waddell & Rogoff, 1981).

This suggests that enhancing the distinctiveness and/or organization of the context would be useful in the training of object location recall. For example, in one study of the importance of visually distinctive contexts, young and older participants were told to memorize the positions of 40 everyday objects (such as a glue bottle and a flower) in one of four conditions: 1) a classroom; 2) a plain, three-dimensional model made to look like the classroom; 3) a colorful, two-dimensional map; or 4) a plain two-dimensional map (Sharps & Gollin, 1987). Thus, contexts ranged from visually distinctive to visually bland. Two minutes after the "tour" of the room/map/model, participants were given 40 cards with the object names printed on them and were told to place the cards where they had earlier seen the objects. The results showed that visual distinctiveness was important in reducing age-related deficits, and scores improved for both younger and older participants as the context became more visually distinct. Furthermore, there was no significant difference between age groups in the number of items correctly replaced for the colorful map, the plain model, or the classroom. Thus, two-dimensional contexts and plain contexts are less visually informative than three-dimensional and/or colorful contexts for both young and older adults; and a visually nondescript (two-dimensional, noncolorful map) context produces age differences favoring the young. Because the addition of visually distinct contexts improves older adults' scores more than it improves the scores of younger adults, it is possible that visual distinctiveness is more important for older adults than for younger adults (Sharps & Gollin, 1987, and Park et al., 1990, provide an exception).

More naturalistic tasks, in which adults remembered the locations of common objects they placed in their own homes or in a laboratory, were used less often. The predominant paradigm for examining this ability was a computerized test called the Misplaced Objects Task (MOT; Crook, Youngjohn, & Larrabee, 1990). In it, participants placed 20 common objects (such as a watch, glasses, and boots) in a computerized representation of a house with 12 rooms, via a touch-sensitive monitor. After a delay of about 40 minutes, participants were shown the house display again and were asked to touch the screen to identify the locations of the objects they placed earlier.

Notwithstanding the task's clear ecologic validity (participants were asked to remember their own selected locations, and the placement was not time-restricted) and the rich visual context in which it was conducted (with highly colorful rooms and objects), studies using hundreds of participants have shown that younger adults' performance was superior to that of older adults, and that age positively predicted performance for locating objects in this way (Crook et al., 1990; Welch et al., 1996; West, Crook, & Barron, 1992b)--even in the easier, noncomputerized version of the task (Crook, Ferris, & McCarthy, 1979). The number of objects replaced correctly on a first attempt, and the total number correctly replaced after two recall attempts, declined with age for each decade following age 49--the 60-year-olds performed worse than the 50-year-olds but better than the 70-year-olds, and the 18-49 age group exhibited performance that was superior to all the older groups (Crook et al., 1990). Regression equations have similarly shown that age predicted 16-18% of the variance in performance (Crook et al., 1990; West et al., 1992b).

These age-related deficits were also found for simulations in which objects were placed into experimenter-designated locations (rather than selected by participants), in a real room in which participants later attempted to relocate the items (West, 1992). For these types of studies, it appeared that locomotion around the room--moving around the room as one would in the real world when placing or finding objects (i.e., naturalistic encoding and retrieval)--enhanced performance for older adults (West, 1992). This suggested that movement may play a role in successful object location recall for older adults.

Why did older adults do so well at this naturalistic task when they showed age-related deficits for the computerized version (the MOT) of the task? The MOT was, after all, considered to be ecologically valid because participants recalled their own choices, rather than potentially irrelevant placements made by an experimenter (Crook et al., 1990). One possible explanation is that, notwithstanding the MOT's ecological validity, it was still carried out in an unfamiliar environment (the lab) through a medium especially unfamiliar to older adults (the computer). Moreover, the floorplan of the MOT may have differed from that found in participants' homes, the laboratory environment differed from the home environment, and the items themselves may have an appearance that differed from similar objects owned by the participants. (A study by Cherry and Park, 1989, found that familiar objects reduced age-related deficits in a relocation task, whereas using unfamiliar objects maintained age differences in performance.) Certainly, the method of placement and retrieval differed, because in a real home, people walk or otherwise locomote to and from object locations (West, 1992). Indeed, one study showed that when older adults walked around a laboratory to place 10 common objects, there were no consistent age differences in recalling the object locations 30 minutes later (see West, 1992). The MOT did not allow for locomotion, because participants placed objects through touching a screen.

Finally, it is difficult to state with certainty whether familiarity was solely responsible for the varied outcomes between studies using the MOT and naturalistic studies (e.g., West, 1992). Whether the excellent performance on the part of older adults when in their own homes may be attributed to a maintenance of spatial skills in familiar surroundings, or whether older adults simply have learned to place items in very consistent locations within their homes, is unclear. Both are probably operating.

In sum, for all but the most naturalistic of tasks, older adults appeared to have an age-related deficit for recall in a variety of object locations tasks. Because this domain bears on issues of independence--one cannot always choose to be in a familiar environment--and because it has rarely been utilized as a memory training domain, it is desirable to test for memory training effects for spatial recall. Previous literature suggested the manner in which memory training may be conducted in order to facilitate object locations recall (e.g., Sharps & Gollin, 1987, 1988;

Waddell & Rogoff, 1981). Participants should be taught to organize the objects as they are placing them, to ensure recall later, because organization will result in greater recall than will random placement. Moreover, participants could be instructed to place items in familiar locations for maximum recall. Finally, participants can be taught imagery techniques which will aid in making the objects and their locations more visually distinctive, and thus more memorable.

The purpose of the present study was to discern whether object locations recall could be successfully enhanced through strategy training. Toward this end, older women were trained to utilize several strategies for recalling the locations of everyday objects, focusing on strategies that used logical organization and enhanced distinctiveness. Trainees chose which strategies to employ on the memory test and strategy assessments were utilized to identify their selected strategies.

THE PRESENT STUDY

Purposes and Hypotheses

The purpose of the present study was to examine an intervention for spatial memory, focusing on object location recall. Everyday memory for spatial locations was assessed in a controlled, laboratory setting, using a simulated everyday memory task.

This study addressed several issues pertinent to memory training and spatial recall. First, this study sought to discern a basic training effect, to be replicated in a control group after they received training. This research was also designed to address each of the concerns that were presented in the literature review, including individual differences, practice effects, measurement of strategies, and maintenance of strategy use and performance.

Participants were randomly assigned to one of two groups: self-efficacy plus strategy training (the SE training group) or a control group. Through use of a no-treatment, wait-list control group, this study ascertained whether the expected gains in self-efficacy and performance were due to training per se, and not to practice alone. Moreover, the individual differences issue was addressed by preselecting the female participants for low performance on self-efficacy and/or performance variables. The present study also measured strategy choices made by participants, to see whether and in what manner the choice of strategies differed as a response to training. Finally, this study provided a six-week followup, to ascertain whether the gains expected between the pretest and the posttest were maintained.

In keeping with the object locations and self-efficacy literature reviewed above, it was hypothesized that (1) the SE training group would have significantly higher location recall and self-efficacy scores at the posttest than the control group; (2) spatial recall and self-efficacy would be increased significantly at the posttest for SE trained participants; (3) performance and self-efficacy levels would be maintained for six weeks after the posttest in the SE training group; and (4) the control group's scores, following general memory training, would rise, although not to a level that would match the expected gains for participants in the SE training group.

A careful reading of the literature was inconclusive with regards to strategy use and strategy maintenance issues. Nevertheless, the training was expected to result in changes in strategy usage because the training program presented many different strategies and provided trainees with the opportunity to select their strategies of choice. Thus, the SE trainees were expected to report using a significantly higher number of strategies at the posttest than the control group. Moreover, participants in the SE training group were expected to use a higher total number of strategies at the posttest than they had at the pretest, and they were expected to maintain these strategy gains for six weeks following the posttest. Control group participants were not expected to increase their strategy use until after they had received memory training, at the followup. Finally, the total number of strategies reported at the posttest was expected to significantly predict object locations performance.

Methods and Materials

Participants

All participants in the present study were participants in an earlier study (Welch et al., 1996). They were selected to participate because their memory and/or self-efficacy scores from the former study showed that they were performing at least one standard deviation below their peers' performance. At the beginning of the present study, 70 older women fit this "at risk" status. They had already received letters informing them about the possibility of participating in a memory improvement study. Then, the author called them and asked whether they would like to participate in the eight-week study. Of the 70 possible participants, 30 older women declined to be included in the present study, either due to circumstances (such as travel plans or a spouse's ill health) or a lack of interest in the project. The participants who declined proved in analyses to be significantly healthier and to have significantly greater vocabulary scores than the women who agreed to participate.

The remaining 40 older women participated in the present study. The participants were randomly divided into two experimental groups: a self-efficacy training group (SE training) or a wait-list control group (control). Following random assignment, there were 19 participants in the SE training group, and 21 participants in the control condition. Means and standard deviations (in parentheses) for the sample demographic characteristics are listed in Table 1, including age, education, and health.

As Table 1 indicates, at the individual posttest held in the beginning of the present study, the two groups did not differ for age, education, Wechsler Adult Intelligence Scale vocabulary (WAIS-R; Wechsler, 1981), self-reported health, or the number of medications taken (all $p > .05$). Similarly, the groups did not differ for these variables at the individual pretest and at the individual followup. Participants were on average 75.5 years old. Table 1 also shows that the participants tended to rate themselves as having good health (a rating of 2.7 on a 10-point scale, with 1 indicating excellent health), and they were well-educated, with an average of 16.1 years of education. Participants' vocabulary scores were also good (mean = 56.0 at posttest out of a possible score of 70). Finally, participants were taking an average of 1.8 medications

TABLE 1

Demographic characteristics of the sample

	CONDITION		
VARIABLES	SELF-EFFICACY	CONTROL	TOTAL
N OF CASES	19	21	40
AGE	76.8 (8.2)	74.4 (5.0)	75.6 (6.7)
YEARS OF EDUCATION	16.5 (2.8)	15.8 (2.4)	16.1 (2.6)
VOCABULARY	54.9 (4.9)	56.9 (5.1)	56.0 (5.0)
HEALTH	2.3 (1.5)	3.0 (1.8)	2.7 (1.7)
MEDICATIONS	1.8 (1.4)	1.9 (1.9)	1.8 (1.6)

a. All differences by condition are nonsignificant, $p > .05$.

b. SELF-EFFICACY and CONTROL represent the SE training group and the waiting-list control group, respectively.

daily. In summary, these participants represented a group of cognitively intact, healthy older women.

Overall Design

A prior testing session (Welch et al., 1996) served as the individual pretest. All the dependent variables to be assessed at the posttest (measures of self-efficacy, location recall, and strategies) were assessed approximately one year prior to the present study for the prospective participants.

At the first session of this intervention program, participants met in groups of four to eight persons assigned to the same condition (SE training or control). Participants were not told of their condition assignment. Participants in both groups signed the informed consent, followed by a brief version of the Spatial Self-Efficacy Questionnaire (SSEQ; Welch et al., 1996) and a boardgame version of the Misplaced Objects Task (MOT; Crook et al., 1990). This served as the group pretest.

After the group pretest, the control group participants did not receive any training until after the individual posttest six weeks later, at which time the control participants received the materials (a training videotape and chapter) for six weeks until the followup test. In contrast, a five-week training program ensued for the SE trainees following the group pretest. During Weeks 1, 2, and 3, SE training group participants were assigned "homework" to interact with the training materials. Then, during the third week, the SE trainees reconvened to receive hands-on location recall practice and an opportunity to utilize the trained strategies. During Weeks 4 and 5, they completed more practice exercises at home with the training materials.

At the end of the fifth week of training/waiting, a group posttest was administered to all participants, using an alternate form of the boardgame MOT. One to two weeks after the group posttest, all participants completed an individual posttest comprised of the computerized MOT and the full-length version of the SSEQ. At this time, SE trainees returned their training materials to the experimenters. They received no further practice for the remainder of the study. At a six-week followup, an alternate form of the MOT was administered individually, as was the SSEQ. An open-ended measure of strategy use and a strategy use checklist were presented in the same forms for the individual posttest and followup as they were for the individual pretest. Strategy use was not measured at the group testing occasions. The author served as the tester at 17 of the individual posttests, when other experimenters were not available. For the remaining individual posttests, and for all followup tests, the tester was blind to the participant's condition assignment.

Assessment Materials and Procedures

Misplaced objects task

The computerized version of the MOT was used at all individual testing occasions. This task has been used extensively in prior research (Crook et al., 1979, 1990). The MOT was a computer-generated location recall task, in which pictures of 12 rooms in a three-by-four matrix were shown on a computer screen along with pictures of 20 common household items (e.g., an umbrella, eyeglasses, keys, hat, and hammer). The 12 computer-image rooms were each different and each resembled a room in a typical house. For example, there were rooms that looked like a laundry room, kitchen, bathroom, and bedroom. Each adult was asked to place the 20 items, one at a time, into a room of her choice by touching the screen picture of the room. No more than two objects were permitted to be placed in a given room. Before participants placed the last item, they were told to keep in mind the locations of the 20 objects for approximately 40 minutes while completing some other activities. They then had 15 seconds to study all the object placements before the screen cleared. Several measures were administered during the delay interval, including the full-length SSEQ. For the individual tests, the delay interval comprised the administration of the SSEQ (see below), the Vocabulary subtest of the WAIS, and the acquisition of participant information regarding age and health. Any time remaining was filled with friendly conversation between the experimenter and the participant until a minimum of 30 minutes (or a maximum of 45 minutes) had passed since the administration of the MOT placement test.

Next, participants completed the MOT retrieval test. For the individual tests, the participants were again shown the MOT computerized "house". As each object name was announced, participants were told to touch the screen indicating the room in which they had earlier placed that object. The experimenter called out each object one at a time, in a different order from that used during the placement phase of the test. The rooms onscreen appeared in the same array as before. If the participant was correct, the object briefly appeared in the room she touched; if she was incorrect, no object appeared, but she had a second chance to recall the object's location before the experimenter presented the next object. The computerized MOT provided data on the number of correct responses on the first and the second attempt to recall the location of the items. For this report, recall on the first attempt served as the dependent measure.

The boardgame MOT was developed by the author specifically for use in group testing in the present study. This task utilized photographs of the same "rooms" seen on the computerized MOT, along with packets of 20 small (approximately one square inch) pictures of common household objects such as those used in the computerized MOT. Pictures of the objects were obtained from computer print shops and magazines. Two forms of the boardgame MOT, form A and form B, were created. The room arrangement differed for the two forms (although the same "rooms" were represented), and 20 unique objects were used for each form. Eight raters indicated how well the available objects fit with the "rooms", by assigning a number from one (for a very good fit) to five (for a very poor fit). For example, in Level 5, form B, most raters agreed that the "calculator" was a near-perfect fit with the "study", rating it a "1". However, the "purse" seemed not to fit particularly well with any "room", and received a rating of "4". This pattern of how many objects fit or did not fit well was similar for forms A and B, with approximately half the objects rated as a "1" and half rated as a moderate-to-poor fit ("3" or "4"). Participants were assigned randomly to receive either form A or B at the group pretest, and the other form at the group posttest.

Participants were given as much time as they wanted to place the pictured items onto the "rooms", with the limit that no more than two items could be placed in one room. Then, participants wrote their placements on a "place sheet" that showed the room arrangements seen on the gameboard. Experimenters made sure the writing was legible and accurate, and then scrambled the objects, put them away, and covered the boardgame with paper so that participants could not see it during a delay interval of approximately 30 minutes. During the delay interval, participants completed the shortened SSEQ, followed by quiet reading of magazines.

Following the delay, the boardgame was again revealed, with the rooms in the same order as before. Participants were instructed to open their envelopes of objects (these had been thoroughly mixed by experimenters after placement was completed) and to put the objects where they had placed them earlier. Participants then wrote the object locations on a "remember sheet" that was later compared to the "place sheet" to determine recall accuracy (see Appendix A for examples of the form B "place" and "remember" sheets). The dependent measure for the boardgame MOT was the number of items written in their proper places on the "remember sheet".

Note that the boardgame and computerized versions of the MOT bore similarities. For instance, in both versions of the task there was no need for the participants to recall the objects themselves or the rooms, just the placement of the objects within the room matrix. Moreover, participants had as much time as they wanted to place and retrieve the items for the boardgame and computerized MOT. The same pictures/photographs of rooms were used for both versions. Although the objects differed for the boardgame and computerized MOT, the number of objects and rooms was the same, and common household objects were used as the stimuli in both. Finally, at retrieval, the objects in both versions were presented in an order different from the placement phase.

Self-efficacy

The Spatial Self-Efficacy Questionnaire (SSEQ; Welch et al., 1996) is a new version of the Memory Self-Efficacy Questionnaire (MSEQ; Berry et al., 1989), intended to measure self-efficacy for tasks which are specifically spatial (see Appendix B). In an earlier study, 17 spatial self-efficacy scales were developed and tested for inclusion in the SSEQ (Welch et al., 1996). After factor analysis, the SSEQ consisted of eight reliable, well-integrated scales representing a single factor of self-reported spatial memory.

The SSEQ required participants to evaluate their ability to succeed on eight different spatial memory tasks, including memory for the locations of objects, routes in a building or city, and spatial arrangements of rooms or communities. Four alternative task orders were employed. Each scale had five levels of difficulty, constructed in a hierarchical fashion with the most difficult level listed first. For each level, participants responded YES or NO to indicate whether or not they believed they could perform the described memory task. Participants also made a confidence decision for each YES response by circling a percentage (from 10-100%) that indicated how certain they were that they could perform the task as described. The shorter version of the SSEQ used for group testing occasions utilized only six of the eight SSEQ scales, to save time. The deleted scales were considered more peripheral to the task of interest (object locations memory) than the other scales.

The SSEQ yielded four dependent measures. The first dependent measure, self-efficacy level, or SEL, was the number of YES responses across all scales. With five items per scale and eight scales, this measure could vary from zero to 40. SELOB, the second dependent measure, was the self-efficacy level for the two object locations scales. This measure could range from zero to 10, because it contained two scales with five items each. A third dependent measure was SEST, or average confidence for YES responses (ranging from 10 - 100% per item), with a NO value computed as a zero. The final dependent self-efficacy variable was SESOB, the average confidence for YES responses for the object locations scales only. SESOB was calculated similarly to SEST.

Strategy use measures

After the MOT retrieval test, at all individual testing sessions, participants indicated the strategies they used during placement and retrieval of the objects on the MOT. Open-ended questions about strategies were followed by a checklist (see Appendix C for a copy of the open-ended questions and Appendix D for the Strategy Use Checklist).

The open-ended questions included items asking participants whether they used strategies; if so, what kind;

and whether the strategies they relied upon were utilized more heavily at placement or retrieval of the objects.

The Strategy Use Checklist contained a list of 10 strategies that participants might use. The strategies represented on the list were based on common responses found during open-ended questions with young adults (Welch et al., 1996). They also represented all of the strategies emphasized in a memory training chapter given to the SE training participants (see below). These strategies included: "egocentric" responding in which the participant placed and/or grouped items as she would in her own home; 'logical' responding in which the participant placed and/or grouped items according to reason (i.e., "where most anyone would think the objects naturally go"); rote repetition of object locations; associating images of objects and rooms; using imagery in which objects and rooms interact (for example, envisioning wet boots dancing through the laundry room); creating a story about the objects and the rooms; and pairing the first letter of the object with the first letter of the room (for example, pairing Keys with Kitchen because both words begin with a "K"). An option of "other, please explain here" was also listed. The total number of selected strategies checked served as the dependent measure from the Strategy Use Checklist. In addition, the types of strategies noted on the Checklist and the open-ended questions were later examined to determine which strategies the SE trainees and control participants were utilizing at the pretest, posttest, and followup.

Training Materials and Procedures

Experimental groups

An experimental group (the SE training group) plus a wait-list control group comprised the experimental manipulation. The control group participants received no training until after the posttest, at which time they were given the memory training chapter and the imagery video (see below), with instructions to review the materials as often as desired and to call the experimenter if they had questions regarding either the chapter or the video (no participants called). Persons in the SE training group participated in five weeks of training with the materials; the training occurred between the group pretest and the group posttest.

Training materials

There were three primary materials used in training: a video, a written chapter, and a set of hands-on location recall exercises. In the 45-minute video, participants were instructed how to use interactive imagery mnemonics to recall object locations and to perform other memory tasks. At numerous points in the video, the narrator suggested that the viewers should pause and practice the imagery techniques described in the video. This video has been used successfully for this purpose in past research (e.g., West & Crook, 1992). The chapter (approximately 30 pages long) was written especially for this project. It described many different mnemonic strategies (as listed above), and illustrated how each could be applied to object locations memory. The chapter also provided suggested practice exercises, to be completed at home. Participants were told that although the chapter's emphasis was on recall for object locations, the strategies presented could apply to many types of memory tasks.

Finally, hands-on location recall exercises were administered in the laboratory session (see below). The exercises used materials similar to those described above for the boardgame MOT utilized during group testing. Four levels of difficulty were created for practice, and trainees moved through these levels in mastery order. That is, participants began with the easiest level and worked up to the most difficult level (see below). The four levels were 1) two rooms, four objects; 2) four rooms, eight objects; 3) six rooms, 12 objects; and 4) eight rooms, 15 objects. The room pictures and object pictures needed for practice at each level were packaged separately in envelopes. This allowed participants to easily identify the materials to be used at each level of difficulty. To give participants an opportunity for continued challenge within a single Level, two forms of each Level--A and B--were constructed. These alternate forms used different rooms and different objects, but had equivalent numbers of rooms and objects. Eight raters judged the logical fit of the objects with the rooms as being equal for both A and B forms for each Level.

Weekly assignments

In addition to receiving the training video and chapter, participants were given week-by-week assignments, with "homework" sheets that listed the assignments and time frames for their completion. Additionally, the author called SE training group participants each week to assure that they were completing the assigned material, and to provide attributional reframing as needed (see below). Assignments and/or laboratory sessions required approximately 1.5 hours each week.

During Week 1, participants in both conditions met in small groups of between four and eight persons for the group pretest. Additionally, following testing, participants in the SE training group condition were given a copy of the training video and chapter, and were shown a portion of the video on a television at the testing site. During the video, the experimenter paused the tape at intervals to demonstrate how to use the video for memory practice. Then, participants received "homework" sheets. All participants owned VCR's, and were told at this first session to watch the memory training video in its entirety once during Week 1, and to fill out a Video Lesson Questionnaire describing their involvement with the video (time spent watching, practice exercises completed, etc.; see Appendix E). The purpose of the Video Lesson Questionnaire was to ensure that participants felt accountable for completing the homework. Participants were told to watch the entire video to control for curiosity; it was possible that even if participants were assigned to watch a portion of the video, some would receive additional training by viewing all of the video.

During Week 2, SE training group participants were instructed to read the memory training chapter in its entirety, and to perform the practice exercises contained in the chapter. Participants additionally filled out a Location Training Chapter Questionnaire indicating how much of the chapter they read, and how many of the practice exercises they completed (A copy of this questionnaire can be found in Appendix F). As with the Video Lesson Questionnaire, the Location Training Chapter Questionnaire was intended as a tool to promote participants' active engagement with the training materials.

During Week 3, participants in the SE training group were instructed to watch the object-locations portion of the video. Later in Week 3, SE training participants came into the laboratory for a group memory training session. During the group session, participants were given hands-on location recall exercises (see procedures below).

Participants in the SE training group were then assigned to read the memory training chapter again, and to fill out the Location Training Chapter Questionnaire during Week 4. During Week 5, participants were again assigned to view the misplaced objects portion of the training video and to complete the Video Lesson Questionnaire. Finally, at the end of Week 5, the group posttest was administered to all participants. The individual posttests followed within one to two weeks of the group posttest.

Mastery orientation

A mastery orientation, considered vital for enhancing self-efficacy (Bandura, 1989), emphasizes mastery of specific skills that will lead to successful outcomes, and encourages trainees to feel attributional "ownership" for their successes. There are several ways to provide a mastery orientation, including the provision of mastery experiences, attributional reframing, goal-setting, and personal control. Each of these techniques was used in this study to build a mastery orientation that would differentiate the SE training group from the wait-list control group. As the discussion progresses regarding each of these techniques, it is important to bear in mind that each of these techniques was not a separate manipulation, but each was designed to provide a mastery orientation for the SE training group.

Mastery experiences. First, the hands-on location recall exercises provided mastery experiences. Mastery experiences are those in which participants succeed at increasingly difficult tasks, thereby increasing the likelihood that they will note their successes and attribute these successes to their own efforts and skills. The exercises were presented in an order of ascending difficulty, which this author terms "mastery order", to enhance self-efficacy. With mastery order, participants would theoretically see that they were mastering increasingly difficult tasks, and then infer that their skills were improving.

Participants were instructed to place a pre-set number of objects onto a pre-set number of rooms, and to write their placements on a "placement sheet". They were then asked to clear their photographed "rooms" of objects and to immediately replace the objects, from memory. For example, participants were first asked to successfully recall the pairings of two rooms and four objects (Level 1), before deciding whether to move on to a higher Level. Participants placed the four objects (pictures of objects) onto two "rooms" taken from the modified boardgame MOT; after recalling the locations of the objects within those rooms, participants scored their work, and then were given the opportunity to decide whether to proceed to the next difficulty Level (see "Personal control" below). Although most participants easily succeeded in recalling all placements correctly for Levels 1 and 2, Levels 3 and 4 proved more challenging, and several participants chose to practice extensively at those Levels.

Attributional reframing. Attributional reframing was provided through the use of verbal statements made during the group laboratory sessions and weekly check-up phone calls. The purpose of the statements was twofold: to deflect negative attributions for failure, and to create a positive climate for success attributions (Elliott & Lachman, 1989). To accomplish this, the experimenter did not make references to negative memory stereotypes. However, when a participant said something self-deprecating (either in the laboratory session or on the telephone), such as "If I weren't so old, I'd do better," or "I'm not as smart as I used to be," or even, "That was just a lucky guess," the experimenter replied with a positive reframing of the negative attribution: "Your memory can be improved with effort. Try to increase your use of the strategies, so you can recall the object locations better." If positive statements about learning were made, the experimenter restated them, saying things such as, "You're doing so well because you've put forth a lot of effort to learn the memory strategies, and because you are good at learning how to use the strategies." Thus, the experimenter used positive language to emphasize that successes were due to learning and effort, and that failures were due to a lack of sufficient effort rather than to the participant's stated lack of ability.

Attributional reframing statements were made whenever anyone in the SE training group made a remark that attributed memory failures to an internal factor such as lack of ability. Thus, negative statements were deflected, and additionally, positive attributional reframing was modeled. It is important to note that the attributional reframing statements used by experimenters not only emphasized effort and ability attributions, but also directed participants' attention to learning. They did not place emphasis on performance outcomes as such, but focused instead on learning. This was done to increase the likelihood that participants in the SE training group would develop a learning, or process, orientation, rather than an outcome, or product, orientation (Elliott & Lachman, 1989).

Goal-setting. Goal-setting was incorporated into the hands-on location practice session, assignment sheets, and weekly phone calls. The weekly "homework" assignments were used to set goals. A sheet describing the homework set a minimum amount of work. In addition to the assigned minimum, SE training group participants were told (on the assignment sheet) to set a goal for work they wished to do that exceeded the assigned amount (see Appendices G and H for copies of the assignment sheets for Weeks 1, 2, and 3).

Goals were also discussed during the weekly phone calls from the experimenter. The experimenter asked each SE group member if she met her minimum and self-set goals each week; this was intended to encourage participants to set and meet goals.

Finally, goal-setting was an important part of the in-lab practice session for the SE training group. First, participants were told at the beginning of the session that "While you're working, it helps to keep in mind what you're trying to do. You are trying to learn how to use strategies to recall object locations. You will be completing some practice exercises today, so that you can practice using the strategies you have learned at home. Why don't you try to complete at least eight exercises today?" These instructions encouraged a mastery orientation, because the instructions emphasized a reachable goal (Schunk, 1985).

Personal control. A mastery orientation was further enhanced through personal control. Participants were given the power to exercise their own judgment and preferences for goals (as indicated above), and for strategy learning and practice exercises.

In strategy learning, participants were provided with myriad strategies that could be applied towards object-locations memory, as set forth in the chapter and video. The chapter and video strongly recommended interactive imagery as the most powerful strategy. At the same time, participants were empowered to choose which strategies seemed most appropriate and appealing to them as individuals, rather than being forced to learn a single strategy preselected by experimenters (as is often the case in the memory training literature; West & Tomer, 1989).

Finally, in the mastery-ordered practice session, SE training group participants were encouraged to exercise personal control. As participants moved through the mastery-ordered practice exercises, a recommendation was provided by the experimenters regarding whether or not individual participants were ready for the next difficulty

Level: "We recommend that you proceed to the next Level of difficulty if you recalled 75% or more of the object's placements on the exercise. So, for this exercise, you may want to go on to the next Level if you were correct on three or more locations." However, the element of personal choice was also emphasized at each Level, encouraging the participants to make their own decision regarding their readiness to progress ("You may be ready for Level 2 now or you may continue at Level 1. The choice is yours."). This element was included to enhance a feeling of personal control considered important in creating a mastery orientation.

Results

The hypotheses for the present study concerned whether the SE training group participants would demonstrate superior self-efficacy and object locations memory performance (as compared to a wait-list control group) at the posttests, and whether they would maintain their performance at a six-week followup. Another aim of the study was to discern whether participants' self-efficacy and skills were increasing across testing occasions, with the greatest increases expected at the test that immediately followed training (i.e., the posttest for SE trainees, and the followup test for wait-list controls). Additionally, hypotheses addressed participants' use and maintenance of the trained strategies, and the relationship between strategy use and memory performance. The results corresponding to each of the experimental hypotheses are presented below.

Results for Self-efficacy and Object Placement Hypotheses

First, analyses of variance (ANOVAs) were conducted to determine whether or not participants in both groups were comparable at the pretest (all $p > .05$). Dependent variables comprised self-efficacy strength and level as measured by the SSEQ, and Misplaced Objects Task performance as measured by the number of objects located correctly on the first attempt (in group and individual test formats, as applicable). Results were also available for the number of objects correctly located on the second attempt for the computerized MOT. However, because results for a second attempt at object location recall were similar to those for the first attempt, only the outcomes for the first attempt are reported here. Condition assignment (SE training group or wait-list control group) served as the independent variable. Second, ANCOVA was used to discern whether a basic training effect favoring SE trainees existed at the posttests (with pretest variance removed), such that SE training group participants recalled more object placements and had higher self-reported spatial self-efficacy. For the followup, ANCOVA was used, with pretest variance removed, to see whether the expected group differences favoring SE training group participants post-training were present at six weeks. These analyses were also conducted with the posttest variance removed, to expose possible group differences in maintenance of change at the followup, and to discern whether the control group had shown improvements following its exposure to the memory training chapter and video. These analyses were conducted with all of the individual test data and with the group data when available.

Overall, ANCOVAs, for individual and group testing occasions failed to support the expected between-group differences (all $\underline{p} > .05$), as predicted by hypotheses 1 and 4. First, self-efficacy level (SEL) and strength (SEST) were not significantly different for control participants and SE training participants at any testing occasion. This was true for the entire SSEQ (all eight scales for the full-length version used in individual testing, and six scales for the group version) and for SELOB and SESOB, the measures of self-efficacy level and strength for the object locations scales only.

For example, participants in both groups did not differ for SEST at either the individual posttest, $\underline{F}$ (1, 36) = 1.00, $\underline{p} > .05$, or at the group posttest, $\underline{F}$ (1,33) = .01, $\underline{p} > .05$. When self-efficacy strength was examined with only the object locations scales (SESOB), these results were again found, with SE trainees and controls performing similarly at the individual posttest, $\underline{F}$ (1, 37) = .53, $\underline{p} > .05$, and at the group posttest, $\underline{F}$ (1, 34) = .19, $\underline{p} > .05$ (see Table 2). Similarly, all tests failed to find between-group differences in self-efficacy level (all $\underline{p} > .05$; see Tables 2 and 3).

TABLE 2

Means and standard deviations (in parentheses) for Self-Efficacy variables, across individual testing occasions, by condition

		TEST		
		PRETEST	POSTTEST	FOLLOWUP
SEST				
	SE	53.07 (17.67)	*85.63 (9.49)	*85.48 (10.01)
	CTRL	56.15 (14.91)	*82.32 (12.18)	*85.57 (12.55)
SEL				
	SE	28.11 (6.26)	27.97 (5.14)	28.63 (5.90)
	CTRL	29.43 (6.03)	28.90 (7.16)	25.71 (12.19)
SESOB				
	SE	50.11 (20.07)	*84.63 (11.23)	*82.21 (11.09)
	CTRL	57.29 (22.51)	*82.37 (11.79)	*84.54 (13.71)
SELOB				
	SE	7.37 (1.83)	7.32 (1.60)	7.63 (1.77)
	CTRL	7.43 (2.52)	7.52 (2.21)	6.81 (3.42)

a. All differences by condition are nonsignificant, $p > .05$.

b. Differences across testing occasions are significant for SEST and SESOB, $p < .0001$. Tests that differ significantly ($p < .05$) from the pretest are denoted with an asterisk (*).

Table 2 continued

c. SE and CTRL represent the SE training group and the control group, respectively.

d. SEST, SEL, SESOB, and SELOB represent Spatial Self-Efficacy Questionnaire overall strength (SEST), overall level (SEL), object-locations scales strength (SESOB), and object-locations scales level (SELOB).

TABLE 3

Means and standard deviations (in parentheses) for Self-Efficacy variables, across group testing occasions, by condition

	TEST	
	PRETEST	POSTTEST
SEST		
SE	81.24 (8.15)	83.02 (11.18)
CTRL	79.31 (10.27)	82.42 (7.68)
SEL		
SE	19.21 (5.84)	18.47 (3.72)
CTRL	20.25 (5.75)	19.60 (5.90)
SESOB		
SE	79.15 (10.64)	80.56 (15.59)
CTRL	78.28 (12.40)	81.78 (9.14)
SELOB		
SE	7.32 (1.98)	7.68 (1.67)
CTRL	7.80 (2.35)	7.45 (2.16)

a. All differences by condition are nonsignificant, $\underline{p} > .05$.

b. SE and CTRL represent the SE training group and the control group, respectively.

Table 3 continued

c. SEST, SEL, SESOB, and SELOB represent Spatial Self-Efficacy Questionnaire overall strength (SEST), overall level (SEL), object-locations scales strength (SESOB), and object-locations scales level (SELOB).

As Table 4 indicates, the SE training group and the control group failed to differ significantly for the number of objects found on the MOT. An examination of the means listed in Table 4 shows that the boardgame format of the MOT yielded higher scores for participants in both conditions than the computerized MOT did. Subjectively, it seemed to experimenters that the boardgame version of the task was easier, and a visual comparison of the means bears this observation. However, regardless of the MOT format, SE trainees and control participants performed similarly (all $p > .05$). The SE trainees were expected to perform significantly better than the control participants at the posttests, because control participants had not yet been exposed to the training materials. However, the two conditions did not significantly differ either for the group posttest, F (1, 35) = .60, $p > .05$, or for the individual posttest, F (1, 34) = 1.71, $p > .05$. The same failure to find between-group differences also occurred for the individual followup test when the pretest variance was removed, F (1, 35) = .15, $p > .05$, and when the posttest variance was removed, F (1, 34) = .30, $p > .05$.

Due to controversy regarding the best methods for examining intervention-related change, repeated measures analyses were also conducted, treating the dependent variables as within-subjects factors. Such analyses allow for the examination of the nature of the expected change in scores between test occasions. Effects were interpreted

TABLE 4

Means and standard deviations (in parentheses) for the Misplaced Objects Task variable, across individual and group test occasions, by condition

		TEST	
	PRETEST	POSTTEST	FOLLOWUP
MOT			
SE	10.84 (3.75)	*13.79 (3.31)	*14.16 (2.85)
CTRL	10.14 (3.20)	*12.33 (2.63)	*14.26 (3.78)
MOT-B			
SE	16.89 (3.13)	*18.26 (3.07)	not applicable
CTRL	17.05 (3.58)	*18.90 (2.20)	not applicable

a. All differences by condition are nonsignificant, $p > .05$.

b. Tests that differ significantly ($p < .05$) from the pretest are denoted with an asterisk (*).

c. SE and CTRL represent the SE training group and the control group, respectively.

d. MOT-B results are not available for the followup because the boardgame version of the task was not used at the followup.

based on significance levels. Scheffe's test ($p < .05$) was used to conduct posthoc comparisons, where appropriate.

For tests taken by individuals, SSEQ and MOT scores were examined across the pretest, posttest, and followup. Repeated measures analyses found significant differences among the testing occasions for the self-efficacy strength variables, but not for the self-efficacy level variables (see Table 2). Self-efficacy strength for the entire SSEQ increased for participants in both groups (SE training and control groups) across the three testing occasions, F (2, 70), = 89.48, $p < .001$. Similarly, self-efficacy strength for the object locations scales of the SSEQ increased across testing occasions, regardless of condition assignment, F (2, 74) = 52.06, $p < .001$ (see Table 2).

For the individual test SEST data, posthoc comparisons showed that participants in both conditions had significantly higher SEST at the individual posttest and followup than they did at the individual pretest (see Table 2). This was true for the overall measure of SSEQ strength and for the object locations scales of the SSEQ. These self-efficacy scores did not differ significantly between the posttest and followup, however, showing that participants in both groups maintained their performance at the followup.

The SSEQ was also given at the group testing occasions. Repeated measures analyses failed to discern any pre-post gains in either self-efficacy strength or level for participants in either condition, as determined with the the brief SSEQ, all $p < .05$ (see Table 3).

Repeated measures analyses from both the computerized MOT and its boardgame version revealed similar results patterns (see Table 4). Specifically, although there were no between-group main effects for either version (all $p > .05$), both versions showed that participants' scores increased across testing occasions in both the SE training group and the control group. Computerized MOT pretest scores differed significantly from the posttest and followup scores, $F(2, 70) = 23.73$, $p < .001$. The posttest and followup MOT scores did not differ significantly, as expected ($p > .05$). Scores also increased significantly for all participants in the group testing situations, $F(1, 37) = 8.43$, $p < .01$, with the posttest scores showing significant increases relative to the pretest scores (see Table 4).

Results for Strategies Hypotheses

Hypotheses for strategy use and maintenance were tested using a variety of analyses, including ANCOVAs, repeated measures analyses (with Sheffe posthoc tests, $p < .05$, where appropriate), correlations, and McNemar tests of change. All analyses measured responses at individual testing occasions only, because strategy use was not assessed at the group testing occasions. The independent variable for these analyses was condition assignment. The dependent variable was the total number of strategies identified on the Strategy Use Checklist. The McNemar tests provided the exception; for those, the dependent variable was the type of strategy used, as gleaned from participants' responses on both the Strategy Use Checklist and the open-ended strategy use questions.

First, ANCOVAs were used to determine whether SE trainees used significantly more strategies than control participants used at the individual pretest, posttest, and/or followup test. On the Strategy Use Checklist (with pretest variance removed), the SE trainees checked significantly more strategies at the posttest than control participants did, $\underline{F}$ (1, 37) = 8.23, $\underline{p} < .01$. The conditions did not differ for total number of strategies checked at the followup test when the pretest variance was held constant, $\underline{F}$ (1, 37), = 3.03, $\underline{p} > .05$, nor when the posttest variance was controlled, $\underline{F}$ (1, 37) = 1.4, $\underline{p} > .05$ (see Table 5).

Repeated measures analyses were conducted that treated strategy use measures as within-subjects variables. This was done due to controversy about change analyses, and to test the hypothesis that the total number of strategies reported would increase following each group's exposure to the training materials (i.e., at the posttest for SE trainees and at the followup for control participants). These analyses demonstrated that the total number of strategies checked on the Strategy Use Checklist interacted with condition assignment, $\underline{F}$ (2, 76) = 3.18, $\underline{p} < .05$.

TABLE 5

Pretest, posttest, and followup means and standard deviations (in parentheses) for the total number of strategies checked, by condition

	TEST		
	PRETEST	POSTTEST	FOLLOWUP
TOTCHK			
SE	3.89 (1.10)	*5.11 (1.10)	4.58 (1.39)
CTRL	4.19 (1.17)	4.05 (1.12)	3.52 (1.99)

a. All differences by condition are nonsignificant, $p > .05$, except for TOTCHK at the posttest, where Self-efficacy training participants reported using significantly more strategies than control participants, $p < .01$.

b. SELF-EFFICACY and CONTROL represent the SE training group and the control group, respectively.

c. TOTCHK represents the total number of strategies checked on the Strategy Use Checklist.

d. These data refer to the individual testing occasions only.

Posthoc analyses showed that the control participants did not differ in their strategy usage at any individual testing occasion, F (2, 114) =1.48, $p > .05$ (see Table 5 for means and standard deviations). However, for the SE training group participants, the number of strategies checked on the list was significantly larger at the posttest than at the pretest, F (2, 114) = 3.75, $p < .05$, and posttest and followup strategy use did not differ, as expected (see Table 5). This partially supports the hypothesis that participants' strategy use would increase following training, regardless of condition assignment. Clearly, however, the expected change existed only for SE training group participants. Control participants' self-reported strategy use did not increase at the followup test.

Another hypothesis regarding strategy use asserted that the total number of strategies used would predict memory performance on the MOT. Using correlations, the total number of strategies checked did not significantly predict MOT performance at the posttest ($r = .12$, $p > .05$), or at any other testing occasion (all $p > .05$).

A final question of interest regarding strategy use concerned changes in various types of strategy use. What specific strategies were participants using? Were SE trainees using different types of strategies than control participants at the individual posttest, before control participants had been taught the strategies? Were SE training group participants changing their preferred strategies across testing occasions?

The McNemar test of change was used in these analyses. This nonparametric test maintains cell independence, allowing a visual comparison of the numbers of persons per cell who were using a specific type of strategy. For the present study's purposes, the McNemar served to facilitate an overall impression of the data rather than to signify statistical differences.

The types of strategies used in the analyses (the dependent variables) included pairing, association, egocentrism, logic, imagery, rehearsal, attention, letter association, the method of loci, and "others". The strategy types were obtained by examining the categories scored for both the open-ended strategy questions and the strategy-use checklist. The computer was programmed to give one point for each 'yes'--that is, each time an individual's self-reported strategy use matched a strategy type, a 1 was assigned. Zeros were assigned when a given strategy type was not reported.

Table 6 shows the McNemar's outcome: a ratio of yes's (how many people used a given type of strategy) to no's, by condition, across the three testing occasions. Several things become evident in looking at the data. First, it appears that, prior to training, certain strategies were popular with both SE trainees and control participants. These "naturally" used strategies included pairing,

TABLE 6

Ratio of yes' to no's for how many people reported using a specific type of strategy, across individual testing occasions, by condition

	TEST		
	PRETEST	POSTTEST	FOLLOWUP
PAIRING			
SE	16/3	18/1	15/4
CTRL	20/1	20/1	15/6
ASSOCIATION			
SE	19/0	19/0	19/0
CTRL	21/0	21/0	18/3
EGOCENTRISM			
SE	18/1	18/1	18/1
CTRL	19/2	21/0	17/4
LOGIC			
SE	19/0	19/0	19/0
CTRL	21/0	21/0	18/3
LETTER ASSOCIATION			
SE	0/19	3/16	7/12
CTRL	1/20	1/20	3/18

TABLE 6 continued

	TEST		
	PRETEST	POSTTEST	FOLLOWUP
IMAGERY			
SE	10/9	15/4	12/7
CTRL	12/9	12/9	11/10
REHEARSAL			
SE	3/16	4/15	4/15
CTRL	3/18	0/21	3/18
ATTENTION			
SE	0/19	1/18	0/19
CTRL	0/21	0/21	0/21
LOCI			
SE	0/19	1/18	0/19
CTRL	1/20	0/21	0/21
"OTHER"			
SE	1/18	3/16	0/19
CTRL	1/20	0/21	0/21

NOTE: SE and CTRL represent the SE training group and the control group, respectively.

association, egocentrism, logic, and imagery. Other strategies were not reported frequently either before or after training; these relatively unpopular strategies included rehearsal, attention, and loci.

How did strategy use change following training? Surprisingly, control group participants reported using some strategy types less after they had received exposure to the training materials, at the followup. These strategies included pairing, association, egocentrism, and logic. After training, the control participants slightly increased their reported use of letter association. SE training group participants, on the other hand, remained fairly constant or changed only slightly in their reported use of most strategies, including association, logic, egocentrism, pairing, rehearsal, and loci. SE trainees also showed some increase in their use of letter association. Interestingly, their largest self-reported change in strategy use was for the use of imagery; 10 trainees reported using imagery prior to training in the SE training condition, whereas 15 reported using imagery at the posttest.

Discussion

Self-efficacy theory (Bandura, 1981) provided the theoretical rationale for the present study. SE trainees partook in a manipulation intended to provide a mastery orientation that combined hands-on location recall practice, goal-setting, attributional reframing, and personal control.

These elements of training were hypothesized to enhance spatial self-efficacy and memory for object locations.

The present study provided two different sets of hypotheses: those concerning the dependent variables of training (self-efficacy and object locations memory), and those regarding the use and measurement of strategies. First, the results related to each set of hypotheses are discussed. Then, a general discussion follows, to provide a plausible explanation for the overall results pattern.

Discussion of Results for Self-Efficacy and Object Placement Hypotheses

The basic training effect served as the first hypothesis concerning self-efficacy and object placement outcomes. According to this hypothesis, SE trainees were expected to demonstrate higher spatial self-efficacy and misplaced objects performance scores than control participants at the posttest. After the control participants had received exposure to the training materials at the followup test, it was expected that their scores would increase relative to their posttest scores (see below). However, even then, SE trainees' scores were expected to be significantly higher, because their training was believed to be more rigorous than control participants'. That is, SE trainees received goal setting instructions, attributional reframing, a hands-on mastery training session, and at-home strategy training and practice with a training videotape and chapter that was aimed at enhancing a mastery orientation. Control group participants, on the other hand, received only the training videotape and chapter, with no further instruction.

Despite these seemingly strong differences in training experiences, the results failed to provide support for either aspect of the hypothesized basic training effect. First, there were no significant between-group differences for any dependent variable at the posttest. This was true for the individually administered posttest, as well as for the posttest that was given in a group format. Second, followup test performance did not show between-group differences.

Why, when the self-efficacy training program was so much more rigorous than the control participants' training, did both groups consistently perform similarly for each dependent variable? An obvious explanation regards statistical power. Power analyses were conducted prior to the present study, using effect sizes garnered from West and Crook's 1992 publication. With only 40 participants in the present study, power analyses demonstrated a 52% likelihood that there would be sufficient power to detect existing differences between the two conditions (Cohen, 1988). Unfortunately, although the power analysis was conducted prior to this research, it was not possible to increase the number of participants available from the earlier study.

Although insufficient statistical power doubtless played a role in the present results, an examination of some relevant means made it difficult to parlay this into a comprehensive explanation (see Tables 2, 3, and 4). First, the means were sometimes oriented such that, with greater statistical power, the hypotheses would have been refuted because control participants had higher scores than trainees. For example, on Table 4, the boardgame MOT results were higher for the control participants than for the SE trainees at the group posttest (although the SE trainees outperformed the control participants for the computerized MOT given at the individual posttest). More often, though, the means were simply very close.

Practice effects may also account for the failure to find the basic training effect. By the end of the present study, each person had taken the SSEQ and the MOT five times. The participants had answered the full-length SSEQ and had taken the computerized MOT three times (once at each individual testing occasion), and they had answered the brief SSEQ and taken the boardgame MOT twice (once at each group testing occasion). Thus, the tests in themselves provided ample practice on the dependent variables. Perhaps this extensive practice itself impacted outcomes more than the experimental manipulation.

Other hypotheses related to within-subjects changes in SSEQ and MOT performance. First, one hypothesis stated that all participants, regardless of condition assignment, would demonstrate increases in self-efficacy and object locations memory across testing occasions, and that these increases would become evident after each group received training. That is, significant gains would be noted for SE trainees at the posttests, and the control participants' scores would increase markedly at the followup. In fact, regardless of condition assignment, participants' scores increased from the pretest to the posttest and remained stable thereafter for the MOT variable and for some of the self-efficacy strength (but not level) variables.

For instance, without respect to the testing format (group or individual), MOT scores rose significantly from the pretest to the posttest. Then, at the individual followup test, scores remained stable for participants in both conditions.

The self-efficacy results were a bit more complex, in part because the results depended on whether the self-efficacy level or strength was being measured. In the individual testing occasion results, strength (as measured by the entire SSEQ and by the object-locations scales of the SSEQ) increased from the pretest to the posttest and remained stable through the followup, for SE trainees and control group participants alike. The self-efficacy level (for the SSEQ as a whole and for the object locations scales), on the other hand, remained stable across the individual pretest, posttest, and followup (see Table 2).

SEL (self-efficacy level) was the number of SSEQ tasks people confirmed or denied (by circling yes or no) that they felt themselves capable of doing. SEL stability was not surprising; it merely indicated that when people said they believed they could (or could not) do a task at the pretest, they tended to still believe that at the other testing occasions. For example, if a participant indicated at the pretest that she believed she could recall 15 object locations for household items she placed around her home, her belief tended to remain stable through the posttest and followup. What did change across testing occasions was the self-efficacy strength outcome. For those tasks participants believed they could do, their confidence (self-efficacy strength, a percentage from 10 to 100%) tended to increase from the pretest to the posttest. For example, the participant who consistently believed herself capable of recalling 15 object placements may have indicated greater assuredness at the posttest than at the pretest. Thus, it appears that although participants' yes/no decisions for tasks did not change, their feelings of confidence did increase for the tasks they felt they could do. Apparently, participants' percentages rose for confidence on the tasks they perceived as feasible (strength); their decision regarding whether or not the task was feasible did not change (level).

Increasing the complexity of the picture regarding the self-efficacy variables, the results differed depending on whether the test given was in an individual or a group format. As stated above, the individual testing format showed that all participants increased their self-efficacy strength from the pretest to the posttest, and then remained stable in their responses at the followup. However, the group testing format failed to discern any significant changes in the SSEQ responses between the pretest and the posttest.

A visual inspection of the relevant means provides an explanation (see Tables 2 and 3). Perhaps participants in both conditions were simply more self-efficacious at the beginning of the present study than they had been a year earlier, when the individual pretest took place. The pretest means listed in Table 2 (taken from the individual testing occasions) for the SSEQ strength variables were much lower--about 30 points lower--than the means expressed throughout the rest of that Table. Those pretest means from the individual testing occasions were also much lower than the group SSEQ strength means expressed in Table 3. For some reason, participants showed increased self-efficacy strength in the interim between the initial pretest from which these participants were selected, and the present research. The reasons why this would occur are discussed below.

Overall, then, the hypothesis that participants' MOT and SSEQ scores would increase significantly following their exposure to the training materials was not supported. The SE trainees showed the expected gains following training, with scores that rose significantly at the posttest. However, the control participants' behavior did not match expectations: Their scores rose at the posttest in the same manner as the SE trainees' scores, and remained stable between the posttest and the followup (when their scores should have risen following training). The reasons for these outcomes are discussed.

Obviously, the SE trainees' MOT scores were probably not improving due to the training. More likely, all participants, regardless of condition, were increasing their MOT scores due to practice effects. This idea is supported not only by the outcomes detailed above, but also by the results for maintenance. Posttest-to-followup scores were expected to be similar for the SE trainees, who were supposed to be maintaining their post-training gains. However, because the control participants, who received training in the posttest-followup interim, showed the same pattern of results, the maintenance hypothesis' support is most likely due to practice effects. The act of repeatedly taking the MOT was enough to bolster both SE trainees' and control participants' scores from the pretest to the posttest, with MOT performance levels maintained thereafter.

The improvements in SSEQ strength outcomes also were not due to training. However, the outcome was probably not due to practice effects. The literature tends to show that self-efficacy decreases slightly following task experience, due to the challenging nature of memory tasks. That is, memory tasks typically are challenging. Participants observe themselves performing at levels below mastery, and their self-efficacy initially decreases. Then, following task mastery, participants' self-efficacy may increase again. However, in the present study, all participants' SSEQ scores rose from the pretest to the posttest. This result may have occurred because of the ease of the boardgame MOT that immediately preceded the group SSEQ evaluation. By examining the relevant means, it is obvious that MOT performance averages were near ceiling at both group testing occasions (see Table 4). It is possible that this success significantly raised SSEQ scores from their expected pre- and posttest levels, and did so regardless of condition assignment.

Another issue to consider is the nature of the sample. The population chosen for the present study may have hampered the finding of significant improvements for SE trainees across testing occasions as compared to the control group. Participants in this study were chosen specifically because their scores placed them in an "at risk" category relative to their peers for MOT performance and/or low spatial self-efficacy. To show the greatest value for training, it seemed important to show its value for at risk populations. Yet, some recent research shows that the capacity to gain from memory training is associated with youth and better cognitive skills before intervention. That is, the people likely to experience the greatest gains from memory training are younger adults (Kliegl, 1990; Kliegl, Smith, & Baltes, 1990; Verhaegen et al., 1992) and older adults with minimal cognitive deficits (Hill et al., 1989). Although performance gains following memory training have been found for older adults, their gains have tended to be smaller than those shown by younger adults (Kliegl, 1990; Kliegl et al., 1990; Verhaegen et al., 1992). For example, training gains were present for older adults for method of loci tasks, but the gains experienced by younger adults were larger (Kliegl et al., 1990). Thus, the training in the present study might have produced more discernable between-group differences, or more impressive within-group gains for SE trainees, if the intervention had offered the training to the most cognitively adept older adults rather than those considered to be "at risk" for poor SSEQ and MOT performance.

Discussion of Results for Strategies Hypotheses

Thus, for the MOT and SSEQ variables, there was no support for the basic training effect hypothesis. In contrast, the strategies hypotheses were frequently confirmed.

First, it was hypothesized that the total number of strategies used at the posttest would be significantly larger for SE trainees than for control group participants. The total number of strategies used was measured by counting the total number of strategies that participants checked on the Strategy Use Checklist. The strategy use measures were taken only at the individual testing occasions.

The results supported the hypothesized basic training effect for the checklist measure: SE trainees indicated that they had used more strategies at the posttest than control participants marked. Increases in strategy use were hypothesized across testing conditions, as well. The total numbers of strategies checked were expected to be elevated following a given group's exposure to the training materials. The checklist measure showed a test by condition interaction, such that only the SE trainees significantly increased their total number of strategies reported across testing occasions. This confirms the hypothesis, because the SE trainees' total number of checked strategies increased following training, at the posttest, and remained relatively stable thereafter.

According to the hypothesis, the control participants' totals also should have risen significantly, at the followup, due to their experience with the training chapter and videotape; yet this did not occur. Rather, control participants' reported strategy totals were the same across all testing occasions. One explanation seems particularly likely for the control participants' failure to increase their self-reported strategy use at the appropriate test: It is likely that the control participants did not invest themselves intensely in the training. First, perhaps they did not really utilize the memory training materials, despite the fact that the materials were in their possession for five to six weeks. Control participants were not required to submit evidence of the amount of their interactions with the training chapter and videotape. Instead, they were sent home with the materials and were told to call the experimenter if they had questions. Alternatively, SE trainees were given homework assignments and were asked and reminded to bring the experimenter filled-in assignment sheets showing that the tasks had been completed. The experimenter also telephoned the SE trainees to make certain the work was being done.

Similarly, perhaps the control group's strategy use did not increase because their training was not as rigorous as the SE trainees'. Even if the control participants used the training materials, their experiences may have been insufficient to produce real learning of the strategies. Whereas SE trainees were told to do the practice exercises with the materials, the control participants were not required to do so. Moreover, the SE trainees received a hands-on training session where they were actively encouraged to utilize the strategies they were learning. This was not experienced by the control group. Thus, the control participants' strategy-use totals did not increase from the posttest to the followup either because they did not study the strategy materials at all, or because their involvement with the materials was relatively superficial.

A third hypothesis related to strategy use ties into the results above. Maintenance of the total number of strategies reported was expected for the SE trainees, following their posttest strategy use increases. The results supported this hypothesis. SE trainees' total number of strategies for the checklist variable did not significantly alter between the posttest and the followup for the checklist variable.

Thus, the hypotheses for a basic training effect, increases in strategy use following training (for the SE trainees), and maintenance of strategy use were confirmed in the present study. Another question asked in the present research concerned whether the total number of strategies used would positively predict MOT performance. Although strategy usage increased after training, as expected, the total number of strategies noted on the checklist failed to predict MOT scores. The possible meaning of this result is discussed below.

Finally, the particular strategies used by participants were examined at each testing occasion. Did the proportion of persons using a given strategy type change according to the condition assignment, and/or within a condition across testing occasions? Although hypotheses were not generated for these questions, and descriptive analyses were conducted rather than significance tests, some of the results are discussed here because they illuminate some specific ways the training changed strategy use. For this analysis, both the open-ended strategy questions and the checklist responses were employed.

First, most of the participants reported (on either the open-ended questions and/or the strategy use checklist) using the "common sense" strategies at the pretest, such as logical placement and pairing/associating items with places they would use in their own homes. About half of the participants in both groups also spontaneously used some form of imagery as a strategy at the pretest. Because imagery is considered a somewhat advanced strategy, and because other studies have suggested that most people do not use mnemonics much in their everyday lives, this was surprising. It is important to note here that in order for a person's open-ended/checklist responses to be scored as "imagery", they did not have to evince interactive imagery; any instance of using pictures in one's mind to recall the material was counted as imagery. Thus, it is likely that most of the participants who reported using imagery were using a rudimentary form (such as picturing a watch in the bathroom), and not distinctive, interactive imagery as presented in training.

After training, the largest difference in SE trainees' behavior was with the imagery strategy. Whereas half of the SE training participants had reported using imagery at the pretest, more than three-quarters of them did so at the posttest (see Table 6). For most other strategy types, SE trainees were remarkably stable in their reported use. Control participants, on the other hand, did not increase their reported use of imagery at the followup test; instead, the primary changes in their behavior seemed to consist of slightly fewer instances of the use of the "common sense" strategy types (pairing, association, egocentrism, and logic), and a slight increase in their use of first-letter association (e.g., placing a watch in the workroom).

General Discussion

The results of the present study did not support the hypotheses related to memory training for spatial self-efficacy and object locations memory tasks. For instance, the evidence refuted the hypothesized basic training effect: Participants in the SE training group did not perform better than control participants at either the posttest or the followup. Instead, the results showed that all participants, regardless of condition assignment, increased their MOT skills and self-efficacy strength from the pretest to the posttest, after which their scores remained stable.

On the other hand, the strategy hypotheses were largely supported by the present study. SE trainees used more strategies post-training than the control participants did at the individual posttest, and only the SE trainees significantly increased their total number of strategies reported following exposure to the training materials.

Thus, there was support for the differential learning and execution of strategies (both in number and in kind, particularly for the imagery strategy) for the SE trainees; yet their MOT/SSEQ performance was not distinguished from the controls groups'. What might explain these seemingly incongruous results? What might account for the overall results of the study?

Some possibilities have already been raised for the lack of between-groups differences on the MOT/SSEQ variables. The statistical power to detect between-groups differences would have been greater with a larger sample. For the MOT, practice effects were stronger than the effects of the training manipulation. Near-ceiling MOT performances on the group pretest may have caused the SSEQ results. The population used might have responded less well to the training than a sample of more cognitively advantaged older adults would have. Still, these explanations are not in themselves sufficient for the study's overall results; they hold true only for the self-efficacy and memory outcomes, because the SE trainees in this "at risk" population did report greater strategy use as compared to the control participants and to themselves prior to training. What, then, can clarify why the strategy use increases evident in the SE trainees were insufficient to provide memory and self-efficacy benefits that were significantly greater than those of practice alone?

A phenomenon noted in the child literature may provide a valid explanation. The phenomenon, called strategy utilization deficiency (SUD), occurs when "children spontaneously produce a strategy, yet producing it results in little or no improvement in their task performance (Bjorklund, Miller, Coyle, & Slawinski, 1997, p. 413)."

According to a recent literature review, SUDs are prevalent in many memory training studies with children. The trainees exhibited high levels of strategy use while simultaneously failing to increase their memory performance, as related to the performance of a control group (Bjorklund et al., 1997).

In the child literature, SUD is a phase in strategy development on the way to competent strategy use. In the first phase, trainees fail to produce the strategy. Later, in phase 2, children produce the strategy partially. In the third phase, children spontaneously produce the strategy, yet their training outcomes show that they do not benefit from it; this is the SUD phase. Finally, in phase 4, children use the strategy effectively, with commensurate raises in performance relative to controls (Bjorklund et al., 1997).

An examination of the current study's results suggests that SUD may account for the older SE trainees' reported spontaneous production of the strategies, coupled with their lack of MOT performance benefits when compared with the control group. But what caused SUDs in this study?

Two explanations emerge, based on the recent review (Bjorklund et al., 1997). First, there were aspects of this study's methodology that may have enhanced the likelihood of SUDs. Also, age-related reductions in working memory capacity may have made SUDs more probable.

The current study made use of multiple training procedures rather than a single procedure, in order to reinforce learning of the strategies in a variety of ways. Instruction was presented verbally and visually; concepts were demonstrated through various media; participants were instructed to use the strategies they were learning, not only when interacting with the training videotape and chapter, but also in a hands-on training session. This methodology allowed each person to direct her own training to an extent, by choosing the strategies she would learn and the amount of time she would devote. The approach was intended to encourage individual trainees to see a payoff in doing the difficult work of learning at least one strategy well. This was also expected to enhance self-efficacy in addition to MOT performance. Additionally, interactive imagery strategies were emphasized the most during training, due to mnemonists' demonstrations that, although more difficult to master than verbal strategies, such visually-based strategies can produce impressive memory benefits when well-learned (e.g., Kliegl et al., 1990).

Despite the fact that this manner of training was adopted specifically to aid older adults' memory performance and self-efficacy, studies within the child literature have shown that the use of multiple training procedures can lead to SUDs (see Bjorklund et al., 1997, for a review). Similarly, although it is unclear in the child literature, the training of multiple strategies, and specifically, the emphasis on training visual strategies rather than verbal strategies, may have made SUDs more likely. Rather than aiding the participants to enhance their performance and self-efficacy outcomes, these approaches may have been overloading their processing resources. First, the presentation of many strategies in a variety of different methods may have created an "access" problem for participants at the time of the tests. According to this account, the responsibility for spontaneously selecting an appropriate strategy, and not the strategy's execution per se, uses participants' mental resources (Bjorklund et al., 1997). Thus, the SE trainees' strategy decision process required time and effort that took mental resources away from processing the to-be-remembered items.

Second, the strategy SE trainees selected could have varied in use of processing resources. Although participants were given the option of using strategies that were less processing-intensive (such as verbal strategies), the interactive imagery strategy identified by the experimenter as the "best" strategy does require considerable working memory capacity (West & Tomer, 1989). As the McNemar tests showed, SE trainees reported an increase in their use of imagery following training: nearly 79% of the SE trainees used the imagery strategies at the posttest, up from just over half at the pretest.

The results showed that most SE training participants were, in fact, able to choose whether to use a strategy, select which strategy to use, and/or apply the imagery strategies, as based on self-report. However, these activities may have taxed the SE trainees' processing resources to the extent that they were unable to focus effectively on the to-be-remembered items, resulting in a strategy utilization deficiency.

Did the lack of sufficient available processing resources arise because of the participants' age? On the one hand, this almost certainly accounts for part of the problem. Older adults exhibit working memory deficits when compared to younger adults (e.g., Kausler, 1994). However, studies with children and adolescents suggest that the learning of a new strategy may tax the resources of even the most cognitively advantaged populations. In fact, SUDs have been found frequently in memory training studies with cognitively normal children, with study samples ranging in age from four to 17 (Bjorklund et al., 1997). Although young children have limited processing resources, it cannot be argued that 17-year-olds are disadvantaged in this way. Thus, the processing resources problem is not wholly a problem of age-associated memory impairment. Rather, the acquisition of strategies is difficult, and the decision to spontaneously produce strategies in testing situations weeks after they are learned is perhaps more difficult still--at any age.

Thus, the present study's overall results may be partly explained by SUDs. The SE trainees' lack of MOT increases and increased strategy use relative to the control group may show that the SE trainees' processing resources were being used for strategy choices and production. Hence, the expected between-group differences were not observed for object locations memory.

Therefore, the larger question emerges. If SUDs can explain the current training manipulation's failure to produce between-group differences for the critical MOT performance variable, then what can be done to eliminate SUDs? How could the study have been conducted differently, so that the increases in strategy use would have benefitted the SE trainees' memory performance relative to the control group? Some ideas have presented themselves in this discussion. First, it may be more beneficial to focus on the training of one strategy, in one format, to reduce the strain placed on the cognitive system when participants attempt to access the strategy spontaneously. Second, it may be more beneficial to train a strategy that produces fewer information-processing demands. Thus, experimenters would need to eschew the popularly trained visual strategies in favor of verbal strategies, such as rote repetition and first-letter association. Finally, and perhaps most important, the trained strategy would need to be taught until its use was automatized by participants. That is, the strategy would be drilled with participants until their level of expertise would result in minimal processing resource demands. In this research, only one hands-on practice session was given. Additional sessions could have had a greater impact. Furthermore, the practice exercises, while challenging, did not require rapid encoding or delayed recall, both of which were required on the computerized and boardgame versions of the MOT. Intensification of the difficulty of practice, combined with additional practice, would enhance task mastery. Some research has shown that this kind of training, even with imagery-based strategies, does produce the expected training gains (e.g., Kliegl et al., 1990). However, further research needs to be conducted to test whether these specific manipulations would result in the desired level of strategy use and its commensurate training gains.

Finally, it is important to note that, although the performance and self-efficacy hypotheses did not have the predicted results, the study methodology represents an improvement over that typically used in aging studies. Indeed, the present results and their explanation would have been altered or absent if not for several methodological improvements made in the current study. For instance, the present study's inclusion of a wait-list control group made possible the assertion that despite significant pre-post gains for the SE trainees, the gains were not due to training per se. The control group's presence elucidated the role of practice effects in the results. The inclusion of participants who were "at risk" for reduced performance and/or self-efficacy made it possible to see whether and how such persons could benefit from training if they were selected based on individual differences. This study also measured strategy use, a rarity in the memory aging literature. The present study has shown strategy use measurement to be important, because the results demonstrated strategy change even in the absence of performance change. Moreover, the current study evaluated six-week performance maintenance, not only for MOT and SSEQ outcomes, but also for strategy use. Although six-week maintenance tests do not represent the desired endstate with regards to continued performance and strategy advantages, even these relatively short tests are rare in the adult memory training literature. Thus, the maintenance test allowed for the discovery that all participants maintained their self-efficacy and object locations gains after the pretests, and that SE trainees maintained their posttest levels of strategy use.

Summary and Conclusions

In summary, older adults, and especially older women, may be a population particularly at risk for reduced spatial memory self-efficacy and/or reduced object locations performance, as compared to men and younger adults. Older adults' self-efficacy may be hampered by real age-associated memory failures, observations of peers' memory failures, societal stereotypes, and fears that any memory lapses herald senility (Welch & West, 1995). Moreover, studies have sometimes shown that women's memory self-efficacy is lower than men's, perhaps due to socialization processes that emphasize superior cognitive capabilities for men than women (e.g., Welch et al., 1996). Finally, a variety of studies have shown that, in all but the most naturalistic situations, younger adults demonstrate superiority for spatial tasks as compared to older adults; this includes memory for object locations (e.g., Welch et al., 1996; West et al., 1992b).

The present study was undertaken to increase object locations memory performance and spatial self-efficacy for older women judged from an earlier study to be "at risk" for low performance on these variables. Strategy training comprised a central component in the memory training that was intended to remediate these deficits. The present study also attempted, through its methods, to address a number of concerns in the memory and aging literature, including practice effects; performance maintenance; individual differences; and strategy measurement, training, and maintenance.

Before the initial group pretest, participants were randomly assigned to either a wait-list control group or a SE training group. The basic training materials consisted of a videotape and a memory training chapter that taught participants to use a variety of strategy types. Interactive imagery, however, received particular emphasis in the materials. In the control group, the participants' exposure to the training materials was delayed until after the completion of the individual posttest; these materials were returned to the experimenter at the followup test. The

SE trainees received their training between the group pretest and the group posttest. Although the SE training included the same training materials the control group received later, the SE training was more intensive, involving goal-setting, attributional reframing, and a hands-on mastery-ordered practice session not encountered by control group participants. These additional training elements were included to enhance a mastery orientation for the SE trainees, so that their performance and self-efficacy would both be addressed.

The results failed to support the hypotheses related to the SSEQ and MOT variables, but did support the hypotheses regarding strategy use and maintenance. Self-efficacy and memory performance were hypothesized to be significantly greater for SE trainees than for controls, and within-subjects gains were expected across testing occasions for both groups; for the SE trainees, the gains were expected to be maintained through the followup. As regards the MOT/SSEQ hypotheses, first, the manipulation intended to create a mastery orientation did not result in a basic training effect for the SE training group relative to the wait-list control participants. Second, although the SE training group's self-efficacy and object locations scores improved from the pretest to the posttest and were maintained thereafter, the control group's scores changed in the same manner, with the two groups performing at the same levels in relation to each other at all testing occasions. Thus, the hypotheses were not supported that examined for maintenance and differential within-subjects gains.

Hypotheses also addressed participants' use and maintenance of the trained strategies. SE trainees were expected to report using a higher total number of strategies at the posttest than control participants, and were expected to maintain their strategy gains. All participants were expected to raise their reported strategy use following their exposure to the training materials. These hypotheses received support: SE trainees reported using more strategies at the posttest than they had at the pretest, and their posttest strategy use was significantly greater than the control group's. The SE trainees also maintained their strategy use levels at the followup. However, the total number of strategies used at the posttest did not predict the MOT scores.

Why did the study confirm the strategy use hypotheses, yet fail to support enhanced MOT and SSEQ outcomes for the SE trainees relative to controls? The reasons the present study failed to find the expected between-groups differences for the SSEQ and MOT variables include reduced statistical power, practice effects, group testing materials that were not sufficiently challenging, and the choice of a sample whose cognitive "at risk" status may have made it difficult for these participants to gain from training in the hypothesized manner.

However, to explain the overall picture of enhanced strategy use for SE trainees, coupled with a lack of between-group differences for performance variables, other explanations must be sought. Strategy utilization deficiencies (SUDs) seem to effectively describe these results, wherein the trained participants spontaneously produce the strategies at the posttest, yet do not benefit with respect to performance gains. The present study's design, which included the training of multiple strategies, an emphasis on imaginal strategies, and multiple training modalities, may have taxed the processing resources of the older adult participants. Thus, the effort expended to access and use the trained strategies may have required too much working memory capacity for the older adults to actually benefit (in terms of MOT performance) from the strategy production.

Future research could elucidate whether factors such as the strategy type, the number of strategies taught, and the manner of training have a bearing on whether strategy utilization deficiencies are found with aging populations. At present, however, the aging literature would be making great strides if it measured strategy use at all; in most cases, these measurements are not made, and as a result, it is impossible in most aging research to discern whether strategies were utilized, and with what success. The time has arrived for aging researchers to rethink their methodologies for memory training. Perhaps by examining the child literature, advances can be made in understanding the current state of affairs in memory and aging.

APPENDIX A
MISPLACED OBJECTS TASK
PLACE AND REMEMBER SHEETS

PLACE SCORE SHEET:

Please use the grid below to write in where you have placed the objects on your game board. This will serve as a score sheet so you can tell how many object locations you recalled. REMEMBER: don't put more than two objects in one room. Good luck!!

LEVEL 5, SET B:

SEWING ROOM (2)	BATHROOM (1)	DINING ROOM (11)	STUDY (3)
DK BLU BEDRM (4)	CHECKERS ROOM (7)	LT BLUE BEDRM (10)	WORK BENCH (5)
GREENHOUSE (8)	KITCHEN (6)	COUCH ROOM (9)	LAUNDRY ROOM (12)

REMEMBER SCORE SHEET:

Please use the grid below to write in where you have placed the objects on your game board. This will serve as a score sheet so you can tell how many object locations you recalled. REMEMBER: don't put more than two objects in one room. Good luck!!

LEVEL 5, SET B:

SEWING ROOM (2)	BATHROOM (1)	DINING ROOM (11)	STUDY (3)
DK BLU BEDRM (4)	CHECKERS ROOM (7)	LT BLUE BEDRM (10)	WORK BENCH (5)
GREENHOUSE (8)	KITCHEN (6)	COUCH ROOM (9)	LAUNDRY ROOM (12)

SCORE:

APPENDIX B
SPATIAL SELF-EFFICACY QUESTIONNAIRE

MEMORY QUESTIONNAIRE

On the following pages, we would like to get your opinions on some questions.

The purpose of these questions is to find out what you think about your own abilities.

There are no right or wrong answers.

DO NOT WRITE
ON THIS
⟵ PLEASE ⟵

DIRECTIONS:

There are some tasks described on the next pages.

Please CIRCLE NO if you think that you can NOT do the task described in the statement.

Please CIRCLE YES if you think that you CAN do the task described in the statement.

If you say YES, please INDICATE HOW CERTAIN you are, by circling a percentage (from 10% to 100%).

These questions ask you about your ability to remember written directions to a store you have never been to before. To help you answer these questions, here is an example of some directions. This is only an example; you will not be asked to remember these directions at this time.

To get to Supermart,
1) go north on Walnut Street.
2) Take a right on Cedar Lane.
3) At the second light, take a right onto Cherry Ave.
4) The first left on Cherry Avenue is Fir Street;
5) the Supermart is the third building on your left as you enter Fir Street.

Q-1. IF I WENT TO THE STORE THE SAME DAY, I COULD REMEMBER 5 STEPS IN A SET OF DIRECTIONS ON HOW TO GET TO A NEW STORE, WITHOUT USING THE DIRECTIONS (circle no or yes in the box)

1 no

2 yes

Q-1a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90%. 100%

Q-2. IF I WENT TO THE STORE THE SAME DAY, I COULD REMEMBER 4 STEPS IN A SET OF DIRECTIONS ON HOW TO GET TO A NEW STORE, WITHOUT USING THE DIRECTIONS (circle no or yes in the box)

1 no

2 yes

Q-2a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-3. IF I WENT TO THE STORE THE SAME DAY, I COULD REMEMBER 3 STEPS IN A SET OF DIRECTIONS ON HOW TO GET TO A NEW STORE, WITHOUT USING THE DIRECTIONS (circle no or yes in the box)

1 no
2 yes

Q-3a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-4 IF I WENT TO THE STORE THE SAME DAY, I COULD REMEMBER 2 STEPS IN A SET OF DIRECTIONS ON HOW TO GET TO A NEW STORE, WITHOUT USING THE DIRECTIONS (circle no or yes in the box)

1 no
2 yes

Q-4a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

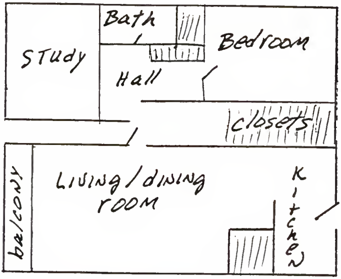
Q-5 IF I WENT TO THE STORE THE SAME DAY, I COULD REMEMBER 1 STEP IN A SET OF DIRECTIONS ON HOW TO GET TO A NEW STORE, WITHOUT USING THE DIRECTIONS (circle no or yes in the box)

1 no
2 yes

Q-5a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

These questions ask you about your ability to draw the floorplan of your own apartment or home. To help you answer these questions, here is an example of a floorplan. This is only an example; you will not be asked to remember this floorplan at this time.



Q-1. IF I WAS ASKED TO DRAW A FLOORPLAN OF MY OWN HOUSE OR APARTMENT, ALL (100%) OF MY DRAWING WOULD BE ACCURATE--THAT IS, ROOMS WOULD BE CORRECTLY PLACED TO THE LEFT OR RIGHT OF EACH OTHER AND THE FLOORPLAN WOULD BE DRAWN CORRECTLY TO SCALE (circle no or yes in the box).

1 no
2 yes

Q-1a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-2. IF I WAS ASKED TO DRAW A FLOORPLAN OF MY OWN HOUSE OR APARTMENT, MOST (80%) OF MY DRAWING WOULD BE ACCURATE--THAT IS, ROOMS WOULD BE CORRECTLY PLACED TO THE LEFT OR RIGHT OF EACH OTHER AND THE FLOORPLAN WOULD BE DRAWN CORRECTLY TO SCALE (circle no or yes in the box).

1 no
2 yes

Q-2a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-3. IF I WAS ASKED TO DRAW A FLOORPLAN OF MY OWN HOUSE OR APARTMENT, MORE THAN HALF (60%) OF MY DRAWING WOULD BE ACCURATE--THAT IS, ROOMS WOULD BE CORRECTLY PLACED TO THE LEFT OR RIGHT OF EACH OTHER AND THE FLOORPLAN WOULD BE DRAWN CORRECTLY TO SCALE (circle no or yes in the box).

1 no

2 yes

Q-3a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-4. IF I WAS ASKED TO DRAW A FLOORPLAN OF MY OWN HOUSE OR APARTMENT, LESS THAN HALF (40%) OF MY DRAWING WOULD BE ACCURATE--THAT IS, ROOMS WOULD BE CORRECTLY PLACED TO THE LEFT OR RIGHT OF EACH OTHER AND THE FLOORPLAN WOULD BE DRAWN CORRECTLY TO SCALE (circle no or yes in the box).

1 no

2 yes

Q-4a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-5. IF I WAS ASKED TO DRAW A FLOORPLAN OF MY OWN HOUSE OR APARTMENT, ABOUT 1-FIFTH (20%) OF MY DRAWING WOULD BE ACCURATE--THAT IS, ROOMS WOULD BE CORRECTLY PLACED TO THE LEFT OR RIGHT OF EACH OTHER AND THE FLOORPLAN WOULD BE DRAWN CORRECTLY TO SCALE (circle no or yes in the box).

1 no

2 yes

Q-5a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

These questions ask you about your ability to remember where you have recently placed common household items. To help you answer these questions, here are examples of some items you could put away, and then look for in 5 to 10 minutes. These are only examples; you will not be asked to find these items right now.

Examples:
Gloves, hat, scarf, shoes, raincoat, spectacles, boots, sweater, magazines, carkeys, housekeys, lighter, purse, wallet, garden hose

Q-1. IF I HAD JUST PLACED 15 ITEMS IN DIFFERENT LOCATIONS IN MY HOUSE, I COULD FIND ALL 15 ITEMS BY REMEMBERING WHERE THE ITEMS WERE LOCATED (circle no or yes in the box)

1 no

2 yes

Q-1a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-2. IF I HAD JUST PLACED 15 ITEMS IN DIFFERENT LOCATIONS IN MY HOUSE, I COULD FIND 12 ITEMS BY REMEMBERING WHERE THE ITEMS WERE LOCATED (circle no or yes in the box)

1 no

2 yes

Q-2a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-3. IF I HAD JUST PLACED 15 ITEMS IN DIFFERENT LOCATIONS IN MY HOUSE, I COULD FIND 9 ITEMS BY REMEMBERING WHERE THE ITEMS WERE LOCATED (circle no or yes in the box)

1 no

2 yes

Q-3a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-4. IF I HAD JUST PLACED 15 ITEMS IN DIFFERENT LOCATIONS IN MY HOUSE, I COULD FIND 5 ITEMS BY REMEMBERING WHERE THE ITEMS WERE LOCATED (circle no or yes in the box)

1 no

2 yes

Q-4a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-5. IF I HAD JUST PLACED 15 ITEMS IN DIFFERENT LOCATIONS IN MY HOUSE, I COULD FIND 2 ITEMS BY REMEMBERING WHERE THE ITEMS WERE LOCATED (circle no or yes in the box)

1 no

2 yes

Q-5a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

The following questions ask you about your ability to manipulate objects in your mind, without actually touching the objects. This is a kind of mental exercise or mental game.
For example, the back of a person's hand looks different than the palm. You could look at the palm of a hand and then imagine, in your own mind, what it might look like if you turned it over. To help you answer these questions, here are examples of some items you might be able to imagine turning over. These are only examples; you will not be asked to do this mental exercise now.

Examples:
cube
cereal box
book
lampshade
dice
coffee cup
picture frame
hat
telephone
scissors

Q-1 IF I HAD PLACED 10 ITEMS IN FRONT OF MYSELF, I COULD ENVISION WHAT ALL 10 OF THEM WOULD LOOK LIKE IF I TURNED THEM OVER, WITHOUT ACTUALLY HAVING TO MOVE THE OBJECTS TO MAKE SURE I WAS RIGHT (circle no or yes in the box).

1 no
2 yes

Q-1a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-2 IF I HAD PLACED 10 ITEMS IN FRONT OF MYSELF, I COULD ENVISION WHAT 8 OF THEM WOULD LOOK LIKE IF I TURNED THEM OVER, WITHOUT ACTUALLY HAVING TO MOVE THE OBJECTS TO MAKE SURE I WAS RIGHT (circle no or yes in the box).

1 no
2 yes

Q-2a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-3 IF I HAD PLACED 10 ITEMS IN FRONT OF MYSELF, I COULD ENVISION WHAT 6 OF THEM WOULD LOOK LIKE IF I TURNED THEM OVER, WITHOUT ACTUALLY HAVING TO MOVE THE OBJECTS TO MAKE SURE I WAS RIGHT (circle no or yes in the box).

1 no

2 yes

Q-3a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-4 IF I HAD PLACED 10 ITEMS IN FRONT OF MYSELF, I COULD ENVISION WHAT 4 OF THEM WOULD LOOK LIKE IF I TURNED THEM OVER, WITHOUT ACTUALLY HAVING TO MOVE THE OBJECTS TO MAKE SURE I WAS RIGHT (circle no or yes in the box).

1 no

2 yes

Q-4a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-5 IF I HAD PLACED 10 ITEMS IN FRONT OF MYSELF, I COULD ENVISION WHAT 2 OF THEM WOULD LOOK LIKE IF I TURNED THEM OVER, WITHOUT ACTUALLY HAVING TO MOVE THE OBJECTS TO MAKE SURE I WAS RIGHT (circle no or yes in the box).

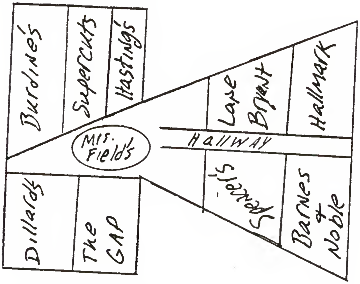
1 no

2 yes

Q-5a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

The following questions ask you about your ability to draw a map of a shopping center you know very well. To help you answer these questions, here is an example of a map of a local shopping center that has 10 shops. This is only an example; you will not be asked to draw the map at this time.



Q-1. IF I WAS ASKED TO DRAW A MAP OF A SHOPPING CENTER WELL KNOWN TO ME, I COULD PLACE 10 OUT OF 10 SHOPS CORRECTLY ON THE MAP (circle no or yes in the box).

1 no
2 yes

Q-1a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-2. IF I WAS ASKED TO DRAW A MAP OF A SHOPPING CENTER WELL KNOWN TO ME, I COULD PLACE 8 OUT OF 10 SHOPS CORRECTLY ON THE MAP (circle no or yes in the box).

1 no
2 yes

Q-2a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-3. IF I WAS ASKED TO DRAW A MAP OF A SHOPPING CENTER WELL KNOWN TO ME, I COULD PLACE 6 OUT OF 10 SHOPS CORRECTLY ON THE MAP (circle no or yes in the box).

1 no

2 yes

Q-3a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-4. IF I WAS ASKED TO DRAW A MAP OF A SHOPPING CENTER WELL KNOWN TO ME, I COULD PLACE 4 OUT OF 10 SHOPS CORRECTLY ON THE MAP (circle no or yes in the box).

1 no

2 yes

Q-4a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-5. IF I WAS ASKED TO DRAW A MAP OF A SHOPPING CENTER WELL KNOWN TO ME, I COULD PLACE 2 OUT OF 10 SHOPS CORRECTLY ON THE MAP (circle no or yes in the box).

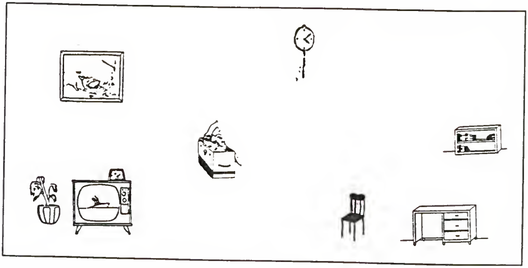
1 no

2 yes

Q-5a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

These questions ask about your ability to intentionally remember the locations of objects in an unfamiliar room one day after seeing the room. To help you answer these questions, there is a diagram below of a room with 8 objects in it. This is only an example; you will not be asked to remember the locations at this time.



Q-1. IF I LOOKED AT AN UNFAMILIAR ROOM THAT HAD 8 OBJECTS PLACED IN DIFFERENT LOCATIONS, AND I MADE AN EFFORT TO REMEMBER WHERE THE OBJECTS WERE, I COULD RETURN THE NEXT DAY AND PUT ALL 8 OBJECTS IN THEIR CORRECT LOCATIONS (circle no or yes in the box).

1 no

2 yes

Q-1a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-2. IF I LOOKED AT AN UNFAMILIAR ROOM THAT HAD 8 OBJECTS PLACED IN DIFFERENT LOCATIONS, AND I MADE AN EFFORT TO REMEMBER WHERE THE OBJECTS WERE, I COULD RETURN THE NEXT DAY AND PUT 6 OBJECTS IN THEIR CORRECT LOCATIONS (circle no or yes in the box).

1 no

2 yes

Q-2a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-3. IF I LOOKED AT AN UNFAMILIAR ROOM THAT HAD 8 OBJECTS PLACED IN DIFFERENT LOCATIONS, AND I MADE AN EFFORT TO REMEMBER WHERE THE OBJECTS WERE, I COULD RETURN THE NEXT DAY AND PUT 5 OBJECTS IN THEIR CORRECT LOCATIONS (circle no or yes in the box).

1 no

2 yes

Q-3a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-4. IF I LOOKED AT AN UNFAMILIAR ROOM THAT HAD 8 OBJECTS PLACED IN DIFFERENT LOCATIONS, AND I MADE AN EFFORT TO REMEMBER WHERE THE OBJECTS WERE, I COULD RETURN THE NEXT DAY AND PUT 4 OBJECTS IN THEIR CORRECT LOCATIONS (circle no or yes in the box).

1 no

2 yes

Q-4a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-5. IF I LOOKED AT AN UNFAMILIAR ROOM THAT HAD 8 OBJECTS PLACED IN DIFFERENT LOCATIONS, AND I MADE AN EFFORT TO REMEMBER WHERE THE OBJECTS WERE, I COULD RETURN THE NEXT DAY AND PUT 2 OBJECTS IN THEIR CORRECT LOCATIONS (circle no or yes in the box).

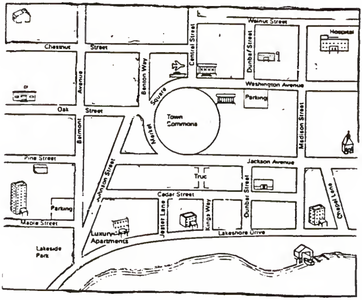
1 no

2 yes

Q-5a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

These questions ask about your ability to learn the downtown area of an unfamiliar city by studying a map. Assume that the downtown area has about 18 major thoroughfares or streets. You would have about 15 minutes to study the map before trying to reproduce it from memory. To help you answer these questions, there is a sample map below. This is only an example. You will not be asked to remember this map now.



Q-1. IF I HAD 15 MINUTES TO STUDY A MAP OF AN UNFAMILIAR CITY, AND THERE WERE 18 MAJOR STREETS IN THE DOWNTOWN AREA, I COULD REPRODUCE THE MAP WITH ALL OF THE STREETS CORRECTLY DRAWN AND LABELED (100%) (circle no or yes in the box).

1 no

2 yes

Q-1a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-2. IF I HAD 15 MINUTES TO STUDY A MAP OF AN UNFAMILIAR CITY, AND THERE WERE 18 MAJOR STREETS IN THE DOWNTOWN AREA, I COULD REPRODUCE THE MAP WITH 80% OF THE STREETS CORRECTLY DRAWN AND LABELED.

1 no

2 yes

Q-2a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-3. IF I HAD 15 MINUTES TO STUDY A MAP OF AN UNFAMILIAR CITY, AND THERE WERE 18 MAJOR STREETS IN THE DOWNTOWN AREA, I COULD REPRODUCE THE MAP WITH 60% OF THE STREETS CORRECTLY DRAWN AND LABELED (circle no or yes in the box).

1 no

2 yes

Q-3a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-4. IF I HAD 15 MINUTES TO STUDY A MAP OF AN UNFAMILIAR CITY, AND THERE WERE 18 MAJOR STREETS IN THE DOWNTOWN AREA, I COULD REPRODUCE THE MAP WITH 40% OF THE STREETS CORRECTLY DRAWN AND LABELED (circle no or yes in the box).

1 no

2 yes

Q-4a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-5. IF I HAD 15 MINUTES TO STUDY A MAP OF AN UNFAMILIAR CITY, AND THERE WERE 18 MAJOR STREETS IN THE DOWNTOWN AREA, I COULD REPRODUCE THE MAP WITH 20% OF THE STREETS CORRECTLY DRAWN AND LABELED (circle no or yes in the box).

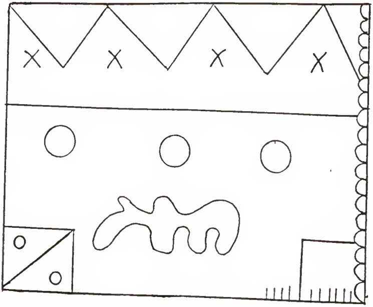
1 no

2 yes

Q-5a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

These questions ask about your ability to correctly copy complex designs from memory. Complex designs have many features and may not be symmetrical. To help you answer these questions, there is an example below of a complex design with 10 distinctive features. This is only an example; you will not be asked to copy it from memory right now.



Q-1. IF I HAD ONE MINUTE TO EXAMINE A COMPLEX DESIGN WITH 10 DIFFERENT FEATURES, I COULD IMMEDIATELY DRAW ALL 10 OF THOSE FEATURES CORRECTLY, FROM MEMORY.

☐ 1 no

☐ 2 yes

Q-1a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-2. IF I HAD ONE MINUTE TO EXAMINE A COMPLEX DESIGN WITH 10 DIFFERENT FEATURES, I COULD IMMEDIATELY DRAW 8 OF THOSE FEATURES CORRECTLY, FROM MEMORY.

☐ 1 no

☐ 2 yes

Q-2a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-3. IF I HAD ONE MINUTE TO EXAMINE A COMPLEX DESIGN WITH 10 DIFFERENT FEATURES, I COULD IMMEDIATELY DRAW 6 OF THOSE FEATURES CORRECTLY, FROM MEMORY.

☐ 1 no
☐ 2 yes

Q-3a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-4. IF I HAD ONE MINUTE TO EXAMINE A COMPLEX DESIGN WITH 10 DIFFERENT FEATURES, I COULD IMMEDIATELY DRAW 4 OF THOSE FEATURES CORRECTLY, FROM MEMORY.

☐ 1 no
☐ 2 yes

Q-4a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Q-5. IF I HAD ONE MINUTE TO EXAMINE A COMPLEX DESIGN WITH 10 DIFFERENT FEATURES, I COULD IMMEDIATELY DRAW 2 OF THOSE FEATURES CORRECTLY, FROM MEMORY.

☐ 1 no
☐ 2 yes

Q-5a HOW CERTAIN ARE YOU THAT YOU CAN DO THIS?
(circle a percentage)

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

APPENDIX C
OPEN-ENDED STRATEGY USE QUESTIONS

STRATEGIES PAGE

1. ASK: "Did you use any strategies or methods to try to remember where you placed the objects in the 'house' on the computer?"

ANSWER:
(fill in
subject's
answer)

2. ASK: "Can you describe the strategies or methods you used to try to remember where you had placed the objects?"

ANSWER:

3. --try to find out what the strategies were, and whether the person used them MOST during encoding (when they placed the objects), at retrieval (when they remembered where the objects were), or equally at both encoding and retrieval:

ASK: "did you use that method more when you were placing the objects, when you were trying to find the objects, or equally at both placement and finding?"

ANSWER:

APPENDIX D
STRATEGY USE CHECKLIST

STRATEGIES CHECKLIST PAGE

Please put a check mark next to ALL the strategies and methods you used today to help you learn and remember where you put the objects; then, circle your most-used strategy.

____ I put the objects where I put those same objects in my own house in real life.
(For example, I put the keys in the kitchen because that's where the keys are kept in my own house.)

____ I put the objects where it made logical sense to put them--not necessarily where I put them in my own house, just where most anyone would think the objects naturally go.
(For example, I put the scissors in the sewing room, because that is where scissors logically go).

---- I put two objects together in a room because I put those objects together in my own house. (For example, I put the hat and the boots together because I keep hats and boots together in my own house.)

---- I put two objects together in a room because it makes logical sense for those objects to go together--I might not necessarily put these objects together in my own house, but most anyone would think the objects naturally go together.
(For example, I put the pen and the letter in the same room because those objects logically belong together).

---- I repeated the locations of objects over and over.

---- I associated mental pictures (images) of locations and objects with each other.

---- I made mental pictures that showed the objects and the rooms interacting.
(For example, I envisioned the boots dancing through the laundry room.)

---- I made up a story about the objects and the rooms.

---- I paired the first letter of the object with the first letter of the room.
(For example, the Keys went in the Kitchen because both start with the letter "K".)

---- Other (please explain here):

APPENDIX E
VIDEO LESSON QUESTIONNAIRE

Video Lesson Questionnaire:

Complete this evaluation form each time you watch the videotape, MEMORY TRAINING WITH IMAGERY.

1. Today's date:

2. Time of videotape start:

3. Time of videotape finish:

****

4. While watching the tape today, I did the following (check all that apply):

_____I listened carefully

_____I imagined, in my own mind, the scenes shown on the videotape

_____I imagined, in my own mind, new scenes and images not provided on the tape

5. If you imagined the scenes we provided on the videotape, please answer the following question. (IF NOT, SKIP TO #7)

Approximately how many of the scenes in the video did you imagine, in your own mind? (check one)
(There were 7 object location scenes shown on the video)

_____I imagined 1 or 2 of the scenes

_____I imagined 3 or 4 of the scenes

_____I imagined 5 or 6 of the scenes

_____I imagined all 7 of the scenes

6. If you imagined the scenes we provided on the videotape, please answer the following question (IF NOT, SKIP TO #7)

Did you find it easy or difficult to imagine, in your own mind, the scenes provided on the video? (check one)

_____It was very difficult
_____It was a bit difficult
_____It was a bit easy
_____It was very easy

7. If you created new images (not provided on the videotape) while viewing the tape, please answer the following question: (IF NOT, SKIP TO #9)

Approximately how many times did you create your own new images while watching the videotape? (check one)

_____I imagined 1 or 2 of my own scenes

_____I imagined 3 or 4 of my own scenes

_____I imagined 5 or 6 of my own scenes

_____I imagined 7 to 12 of my own scenes

_____I imagined more than 12 of my own scenes

8. If you imagined new scenes while watching the videotape, please answer the following question: (IF NOT, SKIP TO #9)

Did you find it easy or difficult to create new images, in your own mind? (check one)

_____It was very difficult

_____It was a bit difficult

_____It was a bit easy

_____It was very easy

9. While watching the videotape today, what new things did you learn to help your memory for object locations?

10. Are there any problems with the videotape? Please list anything that you think we should change.

APPENDIX F
LOCATION TRAINING CHAPTER QUESTIONNAIRE

Location Training Chapter Questionnaire:

Complete this evaluation form each time you read the chapter, WHERE DID I PUT MY KEYS? A PRACTICAL GUIDE TO REMEMBERING OBJECT LOCATIONS.

1. Today's date:

2. Time began reading chapter:

3. Time finished reading chapter:
****

4. While reading the chapter today, I did the following (check all that apply):

_____I read carefully

_____I worked through, in my own mind, the exercises the chapter provided

_____I created, in my own mind, new exercises for the strategies presented throughout the chapter

5. There were many exercises for you to do throughout the chapter. Please place a check mark next to ANY exercise that you completed today:

_____I did the verbal elaboration example given under "Add Meaning to Nonmeaningful Material" on page 6.

_____I did the verbal elaboration example given under "Make Meaningful Material More Memorable" on page 7.

_____I placed four items according to logic (under "Organization By Logic", page 8).

_____I organized items by type or function (under "Organization By Type Or Function", pp. 8-9).

_____I used letter associations to recall object locations (under "Letter Associations", p. 10).

_____I did four practice exercises in the box on page 13 for creating interactive images (under "The Best Images").

_____I did the example for the Method of Loci, located on pp. 13-14.

6. If you finished the exercises we provided in the chapter, please answer the following (IF NOT, SKIP TO #7):

Did you find it easy or difficult to do the examples provided in the chapter? (check one)

_____It was very difficult
_____It was a bit difficult
_____It was a bit easy
_____It was very easy

7. If you created new examples or exercises (not provided in the chapter) while reading the chapter today, please answer the following question (IF NOT, SKIP TO #9):

Approximately how many times did you create your own new examples while reading the chapter? (check one)

_____I created 1 or 2 of my own examples
_____I created 3 or 4 of my own examples
_____I created 5 or 6 of my own examples
_____I created 7 to 12 of my own examples
_____I created more than 12 of my own examples

8. If you created new examples while reading the chapter, please answer the following question (IF NOT, SKIP TO #9):

Did you find it easy or difficult to create new examples, in your own mind? (check one)

_____It was very difficult
_____It was a bit difficult
_____It was a bit easy
_____It was very easy

9. While reading the chapter, what new things did you learn to help your memory for object locations?

10. Are there any problems with the chapter? Please list anything that you think we should change.

APPENDIX G
VIDEO GOAL-SETTING SHEETS

HOMEWORK SHEET, WEEK ONE

[code SE]

Sometimes during memory training, it helps to have something in mind that you're trying to do. This week, your minimum goal is to watch the entire video tape ("Memory Training With Imagery"), and to pause the tape to do the practice exercises, at least once. You also need to complete the form describing your use of the video tape.

But, you may set a goal for yourself and do more than that. How many times will you watch the training video this week? Please fill in this blank with the number that represents your goal: _______________

How many times will you complete the practice exercises on the training video this week?
Please fill in this blank with the number that represents your goal: ______________

HOMEWORK SHEET, WEEK THREE

[code SE]

Sometimes during memory training, it helps to have something in mind that you're trying to do. This week, your minimum goal is to watch only the first 13 minutes of the memory training video, "Memory Training With Imagery". That is, at least once this week, your goal is to watch the part of the video that trains imagery techniques to recall where items are located in your house. Your goal is also to do all the practice exercises in that part of the video at least once this week. You also need to complete the form describing your use of the video tape.

But, you may set a goal for yourself and do more than that. How many times will you read watch the training video this week?
Please fill in this blank with the number that represents your goal: _______________

How many times will you complete the practice exercises in the training video this week?
Please fill in this blank with the number that represents your goal: ______________

APPENDIX H
CHAPTER GOAL-SETTING SHEET

HOMEWORK SHEET, WEEK TWO

[code SE]

Sometimes during memory training, it helps to have something in mind that you're trying to do. This week, your minimum goal is to read the entire memory training chapter, and to do all the practice exercises in the chapter, at least once. You also need to complete the form describing your use of the training chapter.

But, you may set a goal for yourself and do more than that. How many times will you read the memory training chapter this week?
Please fill in this blank with the number that represents your goal: _______________

How many times will you complete the practice exercises in the memory training chapter this week?
Please fill in this blank with the number that represents your goal: ______________

REFERENCES

Anschutz, L., Camp, C. J., Markley, R. P., & Kramer, J. J. (1985). Maintenance and generalization of mnemonics for grocery shopping by older adults. Experimental Aging Research, 11, 157-160.

Anschutz, L., Camp, C. J., Markley, R. P., & Kramer, J. J. (1987). Remembering mnemonics: A three-year follow-up on the effects of mnemonics training in elderly adults. Experimental Aging Research, 13, 141-144.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84, 191-215.

Bandura, A. (1986). Self-efficacy. In A. Bandura (Ed.), Social foundations of thought and action: A social cognitive theory (pp. 390-453). Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1989). Regulation of cognitive processes through perceived self-efficacy. Developmental Psychology, 25, 729-735.

Bandura, A., Adams, N. E., Hardy, A. B., & Howells, G. N. (1980). Tests of the generality of self-efficacy theory. Cognitive Therapy and Research, 4, 39-66.

Bandura, A., Reese, L., & Adams, N. E. (1982). Microanalysis of action and fear arousal as a function of differential levels of perceived self-efficacy. Journal of Personality and Social Psychology, 43, 5-21.

Bandura, A., & Schunk, D. H. (1981). Cultivating confidence, self-efficacy, and intrinsic interest through proximal self-motivation. Journal of Personality and Social Psychology, 41, 586-598.

Berry, J. M., & West, R. L. (1994). Cognitive self-efficacy in relation to mastery and goal setting across the life span. In M. E. Lachman (Ed.), The development of planning and control processes across the lifespan. Hillsdale, NJ: Erlbaum.

Berry, J. M., West, R. L., & Dennehy, D. M. (1989). Reliability and validity of the Memory Self-Efficacy Questionnaire (MSEQ). Developmental Psychology, 25, 701-713.

Biran, M., & Wilson, T. G. (1981). Treatment of phobic disorders using cognitive and exposure methods: A self-efficacy analysis. Journal of Consulting and Clinical Psychology, 49, 886-899.

Bjorklund, D. F., Miller, P. H., Coyle, T. R., & Slawinski, J. L. (1997). Instructing children to use memory strategies: Evidence of utilization deficiencies in memory training studies. Developmental Review, 17, 411-441.

Brody, E. B., Hatfield, B. D., & Spalding, T. W. (1988). Generalization of self-efficacy to a continuum of stressors upon mastery of a high-risk sport skill. Journal of Sport and Exercise Psychology, 10, 32-44.

Bruce, P. R., & Herman, J. F. (1986). Adult age differences in spatial memory: Effects of distinctiveness and repeated experience. Journal of Gerontology, 41, 774-776.

Camp, C. J., Markley, R. P., & Kramer, J. J. (1983a). Naive mnemonics: What the "do-nothing" control group does. American Journal of Psychology, 96, 503-511.

Camp, C. J., Markley, R. P., & Kramer, J. J. (1983b). Spontaneous use of mnemonics by elderly individuals. Educational Gerontology, 9, 57-71.

Cavanaugh, J. C., & Green, E. E. (1990). I believe, therefore I can: Self-efficacy beliefs in memory aging. In E. A. Lovelace (Ed.), Aging and cognition: Mental processes, self-awareness and interventions (pp. 189-230). Amsterdam: North-Holland.

Cherry, K. E., & Park, D. C. (1989). Age-related differences in three-dimensional spatial memory. Journal of Gerontology, 44, 16-22.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences. Hillsdale, NJ: Lawrence Erlbaum Associates.

Crook, T. H., Ferris, S., & McCarthy, M. (1979). The Misplaced-Objects Task: A brief test for memory dysfunction in the aged. Journal of the American Geriatrics Society, 27, 284-287.

Crook, T. H., Youngjohn, J. R., & Larrabee, G. J. (1990). The Misplaced Objects Test: A measure of everyday visual memory. Journal of Clinical and Experimental Neuropsychology, 12, 819-833.

Dittmann-Kohli, F., Lachman, M. E., Kliegl, R., & Baltes, P. B. (1991). Effects of cognitive training and testing on intellectual efficacy beliefs in elderly adults. Journal of Gerontology: Psychological Sciences, 46, P162-P164.

Duke, L. W., Haley, W. E., & Bergquist, T. F. (1991). Cognitive-behavioral interventions for age-related memory impairment. In P. A. Wisocki (Ed.), Handbook of clinical behavior therapy with the elderly client (pp. 245-272). New York: Plenum.

Elliott, E., & Lachman, M. E. (1989). Enhancing memory by modifying control beliefs, attributions, and performance goals in the elderly. In P. S. Fry (Ed.), Psychological perspectives of helplessness and control in the elderly (pp. 339-367). Elsevier Science Publishers, British Vancouver: North-Holland.

Erber, J. T., Abello, S., & Moninger, C. (1988). Age and individual differences in immediate and delayed effectiveness of mnemonic instructions. Experimental Aging Research, 14, 119-124.

Flynn, T. M., & Storandt, M. (1990). Supplemental group discussions in memory training of older adults. Psychology and Aging, 5, 178-181.

Gist, M. E., Schwoerer, C., & Rosen, B. (1989). Effects of alternative training methods on self-efficacy and performance in computer software training. Journal of Applied Psychology, 74, 884-891.

Hasher, L., & Zacks, R. T. (1979). Automatic and effortful processes in memory. Journal of Experimental Psychology: General, 108, 356-388.

Hertzog, C., Dixon, R. A., & Hultsch, D. F. (1990). Relationships between metamemory, memory predictions, and memory task performance in adults. Psychology and Aging, 5, 215-227.

Hill, R. D., Allen, C., & McWhorter, P. (1991). Stories as a mnemonic aid for older learners. Psychology and Aging, 6, 484-486.

Hill, R. D., Sheikh, J. I., & Yesavage, J. A. (1988). Pretraining enhances mnemonic training in elderly adults. Experimental Aging Research, 14, 207-211.

Hill, R. D., Yesavage, J., Sheikh, J., & Friedman, L. (1989). Mental status as a predictor of response to memory training in older adults. Educational Gerontology, 15, 633-639.

Hultsch, D. F. (1969). Adult age differences in the organization of free recall. Developmental Psychology, 1, 673-678.

Kausler, D. H. (1994). Learning and memory in normal aging. San Diego: Academic Press.

Kirasic, K. C. (1989). Acquisition and utilization of spatial information by elderly adults: Implications for day-to-day situations. In L. W. Poon, D. C. Rubin, & B. A. Wilson (Eds.), Everyday cognition in adulthood and late life (pp. 265-283). New York: Cambridge University Press.

Kliegl, R. (1990, April). Triangulation of adult age differences in developmental reserve capacity. Paper presented at the meeting of the Cognitive Aging Conference, Atlanta, GA.

Kliegl, R., Smith, J., & Baltes, P. B. (1989). Testing-the-limits and the study of adult age differences in cognitive plasticity of a mnemonic skill. Developmental Psychology, 25, 247-256.

Kotler-Cope, S., & Camp, C. J. (1990). Memory interventions in aging populations. In E. A. Lovelace (Ed.), Aging and cognition: Mental processes, self-awareness and interventions (pp. 231-261). Amsterdam: North-Holland.

Lachman, M. E., & Jelalian, E. (1984). Self-efficacy and attributions for intellectual performance in young and elderly adults. Journal of Gerontology, 39, 577-582.

Lachman, M. E., Weaver, S. L., Bandura, M., Elliott, E., & Lewkowicz, C. J. (1992). Improving memory and control beliefs through cognitive restructuring and self-generated strategies. Journal of Gerontology: Psychological Sciences, 47, P293-P299.

Murphy, M. D., Schmitt, F. A., Caruso, M. J., & Sanders, R. E. (1987). Metamemory in older adults: The role of monitoring in serial recall. Psychology and Aging, 2, 331-339.

Ohta, R. J., & Kirasic, K. C. (1983). Environmental learning in the elderly. In G. Rowles and R. Ohta (Eds.), Aging and milieu. New York: Academic Press.

Park, D. C., Cherry, K. E., Smith, A. D., & Lafronza, V. N. (1990). Effects of distinctive context on memory for objects and their locations in young and elderly adults. Psychology and Aging, 5, 250-255.

Pezdek, L. (1983). Memory for items and their spatial locations by young and elderly adults. Developmental Psychology, 19, 895-900.

Pratt, J. D., & Higbee, K. L. (1983). Use of an imagery mnemonic by the elderly in natural settings. Human Learning, 2, 227-235.

Rankin, J. L., Karol, R., & Tuten, C. (1984). Strategy use, recall, and recall organization in young, middle-aged, and elderly adults. Experimental Aging Research, 10, 193-196.

Rebok, G. W., & Balcerak, L. J. (1989) Memory self-efficacy and performance differences in young and old adults: The effect of mnemonic training. Developmental Psychology, 25, 714-721.

Robertson-Tchabo, E. A., Hausman, C. P., & Arenberg, D. A. (1976). A classic mnemonic for older learners: A trip that works! Educational Gerontology, 1, 215-226.

Sanders, R. E., Murphy, M. D., Schmitt, F. A., & Walsh, K. K. (1980). Age differences in free recall rehearsal strategies. Journal of Gerontology, 35, 329-337.

Schmitt, F. A., Murphy, M. D., & Sanders, R. E. (1981). Training older adult free recall rehearsal strategies. Journal of Gerontology, 36, 329-337.

Schunk, D. H. (1982). Effects of effort attributional feedback on children's perceived self-efficacy and achievement. Journal of Educational Psychology, 73, 93-105.

Schunk, D. H. (1983). Ability versus effort attributional feedback: Differential effects on self-efficacy and achievement. Journal of Educational Psychology, 75, 848-856.

Schunk, D. H. (1985). Enhancing self-efficacy and achievement through rewards and goals: Motivational and informational effects. Journal of Educational Research, 78, 29-34.

Schunk, D. H., & Rice, M. J. (1989). Learning goals and children's reading comprehension. Journal of Reading Behavior, 21, 279-293.

Scogin, F. (1992). Memory training for older adults. In G. M. M. Jones & B. M. L. Miesen (Eds.), Care-giving in dementia: Research and applications (pp. 269-271). London: Tavistok/Routledge.

Scogin, F., Storandt, M., & Lott, L. (1985). Memory-skills training, memory complaints, and depression in older adults. Journal of Gerontology, 40, 562-568.

Sharps, M. J., & Gollin, E. S. (1987). Speed and accuracy of mental image rotation in young and elderly adults. Journal of Gerontology, 42, 342-344.

Sharps, M. J., & Gollin, E. S. (1988). Aging and free recall for objects located in space. Journal of Gerontology, 43, 8-11.

Sheikh, J. I., Hill, R. D., & Yesavage, J. A. (1986). Long-term efficacy of cognitive training for age-associated memory impairment: A six-month follow-up study. Developmental Neuropsychology, 2, 413-421.

Sinnott, J. D., Bochenek, K., Kim, M., Klein, L., Robie, C., Dishman, K., & Dunmyer, C. (1992). Age and memory for spatial relations. In R. L. West & J. D. Sinnott (Eds.), Everyday memory and aging (pp. 66-84). New York: Springer-Verlag.

Stiggsdotter, A., & Backman, L. (1989). Multifactorial memory training with older adults: How to foster maintenance of improved performance. Gerontology, 35, 260-267.

Treat, N. J., Poon, L. W., & Fozard, J. L. (1981). Age, imagery, and practice in paired-associate learning. Experimental Aging Research, 7, 337-342.

Verhaegen, P., Marcoen, A., & Goossens, L. (1992). Improving memory performance in the aged through mnemonic training: A meta-analytic study. Psychology and Aging, 7, 242-251.

Waddell, K. J., & Rogoff, B. (1981). The effect of contextual organization on the spatial memory of middle aged and older women. Developmental Psychology, 17, 878-885.

Wechsler, D. (1981). WAIS-R manual: Wechsler Adult Intelligence Scale-Revised. San Antonio, TX: Psychological Corporation.

Welch, D. C., & West, R. L. (1995). Self-efficacy and mastery: Its application to issues of environmental control, cognition, and aging. Developmental Review, 15, 150-171.

Welch, D. C., West, R. L., Thorn, R. M., & Clark, N. P. (1996, April). Self-efficacy, gender, and aging: Spatial self-efficacy in relation to location recall. Paper presented at the meeting of the Cognitive Aging Conference, Atlanta, GA.

West, R. L. (1986). Everyday memory and aging. Developmental Neuropsychology, 2, 323-344.

West, R. L. (1989). Planning practical memory training for the aged. In L. W. Poon, D. C. Rubin, & B. A. Wilson (Eds.), Everyday cognition in adulthood and late life (pp. 573-597). New York: Cambridge University Press.

West, R. L. (1992). Everyday memory and aging: A diversity of tests, tasks, and paradigms. In R. L. West & J. D. Sinnott (Eds.), Everyday Memory and Aging (pp. 3-21). New York: Springer-Verlag.

West, R. L. (1995). Compensatory strategies for age-associated memory impairment. In A. D. Baddeley, B. A.

West, R. L., Bramblett, J. P., Welch, D. C., & Bellott, B. (1992a, April). Memory training for the elderly: An intervention designed to improve memory skills and memory self-evaluation. Paper presented at the meeting of the Cognitive Aging Conference, Atlanta, GA.

West, R. L., & Crook, T. H. (1992). Video training of imagery for mature adults. Applied Cognitive Psychology, 6, 307-320.

West, R. L., Crook, T. H., & Barron, K. L. (1992b). Everyday memory performance across the lifespan: Effects of age and noncognitive individual differences. Psychology and Aging, 7, 72-82.

West, R. L., & Knabb, P. D. (1994, August). Gender differences in everyday memory and memory self-efficacy in older adults. Paper presented at the Practical Aspects of Memory Conference, Baltimore, MD.

West, R. L., & Tomer, A. (1989). Everyday memory problems of healthy older adults: Characteristics of a successful intervention. In G. C. Gilmore, P. J. Whitehouse, & M. L. Wykle (Eds.), Memory, aging and dementia: Theory, assessment, and treatment (pp. 74-98). New York: Springer.

Williams, S. L., Dooseman, G., & Kleifield, E. (1984). Comparative effectiveness of guided mastery and exposure treatments for intractable phobias. Journal of Consulting and Clinical Psychology, 52, 505-518.

Williams, S. L., Kinney, P. J., & Falbo, J. (1989). Generalization of therapeutic changes in agoraphobia: The role of perceived self-efficacy. Journal of Consulting and Clinical Psychology, 57, 436-442.

Williams, S. L., Turner, Sm L., & Peer, D. F. (1985). Guided mastery and performance desensitization treatments for severe acrophobia. Journal of Consulting and Clinical Psychology, 53, 237-247.

Williams, S. L., & Zane, G. (1989). Guided mastery and stimulus exposure treatments for severe performance anxiety in agoraphobics. Behavior Research and Therapy, 27, 237-245.

Willis, S. L. (1989). Cognitive training: Which old dogs learn what tricks? In L. W. Poon, D. C. Rubin, & B. A. Wilson (Eds.), Everyday cognition in adulthood and late life (pp. 545-569). New York: Cambridge University Press.

Wilson, & F. N. Watts (Eds.), Handbook of memory disorders (pp. 481-500). New York: Wiley.

Wood, L. E., & Pratt, J. D. (1987). Pegword mnemonic as an aid to memory in the elderly: A comparison of four age groups. Educational Gerontology, 13, 325-339.

Yesavage, J. A. (1983a). Concentration and mnemonic training in elderly subjects with memory complaints: A study of combined therapy and order effects. Psychiatry Research, 9, 157-167.

Yesavage, J. A. (1983b). Imagery pretraining and memory training in the elderly. International Journal of Experimental and Clinical Gerontology, 29, 271-275.

Yesavage, J. A., & Jacob, R. (1984). Effects of relaxation and mnemonics on memory, attention and anxiety in the elderly. Experimental Aging Research, 10, 211-214.

Yesavage, J. A., Lapp, D., & Sheikh, J. I. (1989). Mnemonics as modified for use by the elderly. In L. W. Poon, D. C. Rubin, & B. A. Wilson (Eds.), Everyday cognition in adulthood and late life (pp. 598-611). New York: Cambridge University Press.

Yesavage, J. A., & Rose, T. L. (1984). Semantic elaboration and the method of loci: A new trip for older learners. Experimental Aging research, 10, 155-159.

Yesavage, J. A., Rose, T. L., & Bower, G. H. (1983). Interactive imagery and affective judgments improve face-name learning in the elderly. Journal of Gerontology, 38, 197-203.

Zarit, S. H., Cole, K. D., & Guider, R. L. (1981a). Memory training strategies and subjective complaints of memory in the aged. Gerontologist, 21, 158-164.

Zarit, S. H., Gallagher, D., & Kramer, N. (1981b). Memory training in the community aged: Effects on depression, memory complaint, and memory performance. Educational Gerontology, 6, 11-27.

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Duana C. Welch was born in Lubbock, Texas, in 1968, and was raised in San Antonio, Texas. She attended Judson High School in San Antonio, followed by her education at Southwestern University in Georgetown, Texas, from 1987 through 1991, at which time she earned her Bachelor of Arts in psychology. In 1991, she moved to Gainesville, Florida, to pursue her education in psychology and aging through the Developmental Area in the University of Florida's Department of Psychology. Since then, Ms. Welch has earned her Master of Science degree (August, 1994) and has received a certification in Gerontology (April, 1995), both through the University of Florida. She is engaged to Donald A. Cameron, with whom she is planning their July 3rd wedding. Ms. Welch has accepted a tenure-track assistant-professor position in Psychology and Aging at the California State University, Fullerton.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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